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LECTURES

ON THE

THEORY AND PRACTICE

OF

PHYSIC.

BY WILLIAM STOKES, M.D.,

LECTURER AT THE MEDICAL SCHOOL, PARK STREET, DUBLIN; PHYSICIAN TO THE MEATH HOSPITAL, ETC., ETC.

AND

BY JOHN BELL, M.D.,

LECTURER ON MATERIA MEDICA AND THERAPEUTICS; FELLOW OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA;
CORRESPONDING SECRETARY OF THE PHILADELPHIA MEDICAL COLLEGE;
MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY, AND OF THE GEORGOFILI SOCIETY OF FLORENCE, ETC., ETC.

SECOND EDITION.

IN TWO VOLUMES.

VOL. II.

SURGEON GEN'LS OFFICE
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Philadelphia:
ED. BARRINGTON & GEO. D. HASWELL.

NEW YORK — J. & H. G. LANGLEY: CHARLESTON, S. C. — WM. H. BERRETT.
RICHMOND, VA. — SMITH, DRINKER, AND MORRIS.
LOUISVILLE, KY. — JAMES MAXWELL, JR.

1842.

[Entered, according to act of Congress, in the year 1842, by Barrington and Haswell, in the clerk's office of the district court for the eastern district of Pennsylvania.]

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LECTURES

ON THE

THEORY AND PRACTICE OF PHYSIC.

DISEASES OF THE URINARY APPARATUS.

LECTURE LI.

DR. BELL.

Accumulation of knowledge of urinary diseases of late years—Importance of the function of the kidneys—Their office as depurators—Immediate seat of urinary secretion—Influence of the nerves on this function—Ingredients of human urine—The chief ones noticed—Water—Urea—Lithic or uric acid; its combinations—Sulphuric and phosphoric acids, and their combinations—Albumen; its tests in urine—Xanthic acid—Cystic oxide—Sugar—Oxalic acid—Bile—Secretion of the prostate gland—Pus—Diseased structure of the kidney—Healthy size and weight—Exploration.—NEPHRITIS—Its species—Hyperæmia common to them all in the beginning.—*Symptoms;* organic and functional; remote or sympathetic—May be confounded with original disease of stomach and bowels—Attention to state of the urine.—*Causes;* traumatic and constitutional.—*Anatomical lesions*—Chronic nephritis; its symptoms, lesions, and causes.—*Nephralgia.*—*Treatment of nephritis* in general—The acute form requires active antiphlogistics—Nephritis in fevers.

THE period is not long beyond which the strictly medical consideration of diseases of the urinary apparatus could be easily discussed within narrow limits. Inflammation of the kidneys and bladder, and obstructions, by calculi, of the ureters, were the chief morbid conditions of the organs; the passage of calculi, the deposit of gravel and sand, and some obvious deviations from the healthy appearance of this fluid, were the chief external symptoms, in addition to the common rational ones of functional disturbance, indicating disease of this apparatus,—to make up our symptomatology. To the organological part was then added an inquiry into nervous irritation, or *nephralgia* of the kidney, as distinct from inflammation and *nephritis;* and a mixed condition of the bladder, or neuralgia, with disease of the mucous coat, constituting *catarrhus vesicæ*, or *cystorrhœa*, separated from *cystitis*, or decided inflammation of this organ. Chemistry also came in aid of the observation of the simple physical states and changes in the urine, as marked by its colour, its transparency or turbidness, and deposits of various consistence and hue. Blackall and Wells first, then Cruikshank, Marcet, and Bostock, showed by chemical tests that the urine was modified

in its composition by various morbid states of the economy, as in dropsy, diabetes, &c. Then appeared the more extended and connected researches of Prout; and more recently, or about fifteen years ago, the first observations of Bright, suggesting the connexion between diseased kidney and concomitant disorders of other organs, and a particular condition of the urine. In this road thus opened, have followed Gregory and Christison, Osborne, Willis and Venables, Rayer and Solon, and others; so that now, whilst grateful for the vast accumulation of positive facts, and an incipient arrangement into a system, setting forth the extended and various diseases of the urinary apparatus, we look with hesitation, not unmixed with dread, at the number of volumes, so intrinsically rich too, before us, when we think of condensing from them a brief yet connected and consistent sketch of the whole subject. For myself, I do not hesitate, at once, to decline such an attempt at this time. The most that I can hope to do, under present restrictions, which, by the way, are partly voluntary and partly compulsory, is to indicate the more important points, which will help you in your own more extended and detailed inquiries hereafter.

First, then, I propose to notice, very briefly, the acute and chronic inflammations of the renal apparatus, its structural changes, and morbid secretions; and then endeavour to indicate how far these morbid changes are causes, or associated with various important functional derangement in other parts. Perhaps I ought to say, that this will be the scope of my observations in this lecture; but without, perhaps, rigidly preserving the order of sequence which I propose to myself.

The anatomist must have been struck with the large proportion of arterial blood which the kidneys receive from the descending aorta by the renals; nor could the physiologist be slow in inferring from this arrangement, and still more from the amount of secretion, and its changes in appearances and quantity, with the several periods of digestion and cycle of other functions, their important role in the animal economy. Still more positive conclusions of this nature were drawn from observing the possession of a renal apparatus in animals, even of a low grade of organization. Insects have been found to secrete uric acid through their long Malpighic canals; and which latter have even contained calculi of this acid; and the same substance has been discovered in the *saccus calcareus* of the *Mollusca*. The kidneys are among the chief depurators of the economy; being, in this respect, only second to the lungs, and taking precedence of the skin and bowels. If we regard the exclusive function of depuration, or of excretion following secretion, the renal is without parallel; — all the other organs have absorbent together with secretory function, and the first of these is in them all connected with the wants of assimilation and growth. The kidneys have a secretory function alone; their absorbing power is purely interstitial; or if exercised on their secreted fluid, it is only so in extreme and pathological conditions of the organ. They discharge azote, as the lungs do carbon, and these are the elementary basis of the chief excretions from the living body. The

quantity of solid renal secretion is in strict proportion to the quantity and kind of food taken as aliment; and by M. Chossat (*Journ. de. Physiolog.*, t. v., 1825), was found to be, in reference to farinaceous, albuminous, and fibrinous aliment, in the ratio of 5.7.9. It would hence appear, that the quantity of azote contained in the food is the principal element determining the amount of solid excrementitious urinary matter. M. Chossat found, in fact, that ten-elevenths of all the azote ingested with the food were discharged by the kidney. (Willis—*Urinary Diseases and their Treatment:* Philadelphia Edition.)

The immediate seat of the secretion of urine is the convoluted *tubuli* of the cortical, and most probably, also, of the medullary substance of the kidney: this fluid is poured out, as we are told by Müller, from the whole internal surface, and not their extremities only. The influence of the nerves over renal secretion is manifested in the result of experiments, which consisted in a destruction of the renal nerves; and which was followed by an entire suspension of the secretion, although the blood still circulated nearly as before.

The Urine and its Ingredients.—Healthy human urine, says Prout, when recently voided and still warm, is a transparent fluid, of a light amber colour. At this time it reddens litmus paper, and its odour is slightly aromatic, and somewhat resembles that of violets; but the taste is bitter and disagreeable. As it cools, the aromatic odour leaves it, and gradually gives place to another which is peculiar, and well known by the name of *urinous*. In a few days the urinous odour is succeeded by another, which has been compared to sour milk. At length, this also disappears, and is finally succeeded by a fetid alkaline odour. The sensible qualities of the urine, however, as well as the changes it undergoes, are subject to great varieties from many causes; such as different articles of food, different diseases, &c., as will be subsequently shown.

The quantity of urine secreted varies with the climate, the season, and temperament, and also the sex, being generally less in women in the better classes of society than in men, owing to the more abstemious habits of the former. In Great Britain from 30 to 40 ounces is estimated to be the average quantity in the twenty-four hours. The specific gravity of urine is from 1·15 to 1·25.

Azote has just now been represented to you as the chief element of renal secretion, or of urine; and I may add, that its two principal forms of combination are *urea* and *uric* or *lithic acid*. But, before proceeding to speak of these substances, it is proper to apprise you of the composition of healthy urine, which, according to Berzelius, consists of the following ingredients, the proportions being to a thousand parts of urine:—

Animal and destructible principles.	*a.*	Water	933·00
	b.	Urea	30·10
	c.	Lithic acid	1·00
	d.	Free lactic acid, lactate of ammonia, and animal matters not separable from them	17·14
	e.	Mucus of the bladder	0·32

Alkaline and earthy salts.	*f*	Sulphate of potash	3·71
		——— of soda	3·16
	g.	Phosphate of soda	2·94
		——— of ammonia	1·65
	h.	Muriate of soda	4·45
		——— of ammonia	1·50
	i.	Earthy phosphates, with a trace of fluate of lime	1·00
		Silex	·03
			1000.00

Besides these ingredients, which appear to be essential to healthy urine, this excretion, in different diseases, has been found to contain the following additional matters: —

k. Albumen, Fibrin, Red particles } of the chyle and blood.
l. Various acids, colouring matters, &c., formed from, or accompanying, the lithic acid. Nitric acid.
m. Xanthic oxide.
n. Cystic oxide.
o. Sugar. Oxalic acid. Carbonic acid.
p. Hippuric acid? Benzoic acid?
q. Prussian blue; cyanurine. Indigo.
r. Bile. Cholesterine.
s. Secretion of the prostate gland, &c.
t. Pus; and perhaps other matters.

I cannot follow either Prout or Willis in detailing the properties of all these ingredients, and the circumstances under which they are formed; but must be satisfied with a few observations on the chief ones. *Water*, the base of the urine as it is of all the animal fluids, may vary considerably in its proportions compatibly with health: but in some diseases its increase is accompanied by an increase of a natural ingredient, as of urea; or of unnatural ingredients, as of albumen or sugar. On the other hand, the proportion of water to the urine is not unfrequently very much below the natural standard, as in the various forms of urinary suppression. *Urea* was long believed to be peculiar to the urine, and of course to be a result of renal secretion; but it is now ascertained, that it may be formed from the constituents of the blood, without the agency of that organ. Urea is transparent and colourless, and without remarkable smell or taste: of course it does not impart to urine either the colour or other properties characteristic of this fluid. Urea is neither sensibly acid nor alkaline. At a high temperature it is converted into ammonia, cyanate of ammonia, and dry, solid, cyanuric acid. It is

soluble in its own weight of cold water, and in every proportion in hot water. Urea combines with several acids, but does not neutralise them. Alkalies scarcely affect urea at low temperatures, but when it is assailed by heat, they rapidly convert it (together with water) into the carbonate of ammonia.

In certain diseases of the kidney, urea exists in the blood in considerable quantities, as ascertained by Dr. Christison and others. There are diseases connected both with an excess and a deficiency of urea in the urine.

Lithic or *uric acid*, supposed once to be a product of morbid secretion, is now known to be an invariable ingredient of healthy urine; and present in solution at all ordinary temperatures. If it exists in the blood at all, it is in very small quantity only. Prout supposes it to be combined with ammonia, and not to be secreted in a free state. It is rendered probable by Liebig and Wühler, that lithic acid is a compound of urea and a substance itself composed of cyanogen and carbonic oxide. The *lateritious* and *pink* sediment were supposed by Proust to constitute a peculiar acid, which he named *rosaceous;* but these have been found to consist essentially of the *lithate of ammonia*, and, sometimes, of the *lithates* of *soda* and *lime*, in small proportions. They owe their colouring matter partly to the colouring matter of the urine, and partly to the purpurate of ammonia. The colouring matter of the urine consists of yellow principles, more or less acted on by nitric acid, which Prout supposes to be in some way an ingredient of healthy urine.

The next and most important form in which lithic acid appears in the urine, is that of lithic acid gravel, the immediate cause of the precipitation of which is the lactic acid, which is generally at this time secreted in excess, either separately, which is comparatively rare, or in a state of combination with urea, which seems to be the rule. The frequent presence of sugar in urine depositing lithic acid gravel and the frequent appearance of lithic acid gravel in slight forms of diabetic disease, are explained by our learning, that "the lactate of urea and the saccharate of urea are, in fact, but modifications of the same substance, and may be considered as the representatives of gelatin; the lactic acid being, as we have said, only a modification of the saccharine principle."

The lithic acid is, on the same authority (*Prout*), a principle of albuminous origin, and may be readily distinguished by the development of the purpurate of ammonia, by the aid of the action of the nitric acid and heat.

The *sulphuric* and the *phosphoric* acids appear to exist in healthy urine in union with soda, potassa, and ammonia, and partly with magnesia and lime. The muriates of potassa and soda occur both in the blood and the urine. Muriatic acid exists only, in the urine, in combination with ammonia. I shall not make any remarks on the other constituents of healthy urea, but devote a few words to the foreign substances which are occasionally found in it; and one of which, *albumen*, has of late become an exceedingly important diagnostic test of certain diseases.

Albuminous urine, on being exposed to a high temperature, undergoes coagulation; and its albumen at first collects on the surface, and then is deposited. Nitric acid added to the urine has the same effect.

The chief component parts of calculi merit a passing notice. Of these are the *xanthic acid*, (the *uric* or *lithic oxide* of Liebig,) and the *cystic oxide*, which last is peculiar to the urine, and sometimes forms whole calculi. Prout, however, regards its presence in the form of calculus to be quite rare; but admits its not uncommon occurrence in certain states of disease. *Sugar* is not found in the blood in a state of health; but is generally recognised in the blood of diabetic individuals, where it probably always exists in a greater or less degree: nor is it a natural ingredient of the urine, although found in large quantities in diabetes. *Oxalic acid* is neither found in the blood nor in the urine in a state of health; but in certain forms of disease probably exists in both fluids. It is usually found in conjunction with lime, forming the oxalate of lime or mulberry concretion. Sometimes it appears as an amorphous sediment: in rare instances as gravel.

Bile, in certain diseases, and particularly jaundice, makes its way not only into the blood but into the urine. "Urine containing bile is generally of a deep brownish-red colour, when in considerable quantity and viewed by a transmitted light. But when contained in small quantity, it has sometimes a yellowish-green appearance. A piece of white linen, it is well known, will be stained yellow by bilious urine; and the addition of muriatic acid renders it green. In organic affections of the kidney and liver, Prout has occasionally seen in the urine a crystallized fatty substance, similar to that frequently met with in encysted tumours and various malignant affections, and which has been considered as cholesterine by Caventou, Breschet, Dr. Christison, and others.

The *secretion of the prostate gland* sometimes appears in the urine. In general it may be distinguished from mucus by its albuminous properties, and by its peculiar appearance. *Pus* occasionally appears in the urine in great abundance, so as to render its presence unequivocal. Most generally, it is accompanied by mucus; and between the two there seems to be a close relation. "Pus, when well marked, may be distinguished from mucus by being essentially composed of particles. Hence, when diffused through the urine, which it readily may be, pus, after a time, again subsides to the bottom of the vessel, in the form of a pale, greenish-yellow, pulverulent deposit, and the urine assumes its transparent character. Urine containing pus is almost always invariably albuminous. Pus may be detected if it and mucus both are present in the urine, by this fluid becoming alkalescent; the ammonia evolved converts the pus into a peculiar glairy substance, which imparts to the urine a ropy consistence.

To facilitate a recapitulation of the preceding details, which are derived from Prout, and often given in his own words, I place before you the following table, also found in his work: —

TABLE. — Exhibiting a contrasted view of the relations between the principles of the blood and the principles of the bile and of the urine, formed either mediately or immediately from the blood.

BLOOD *contains*,				BILE *contains*,		URINE *contains*,	
In *health*.			In *disease*.	In *health*.	In *disease*.	In *health*.	In *disease*.
Water	Represented in the *Urine* by			Water	Represented in the *Bile* by	Water	
Albumen						Albumen	
Urea (lactate of)			Carbonate of ammonia Sugar Oxalic acid, &c.			equivalent to Gelatin	Urea Sugar
			Purpurate of ammonia, &c. Xanthic oxide Cystic oxide Secretion of prostate Pus Prussian blue Indigo? &c.	Picromel?	Albumen?		Lithic acid? Lithate of soda?
Lithic acid Lithate of ammonia						Fibrin equivalent to Albumen	
Mucus				Mucus			
			Colouring matter of bile Biliary resin Cholesterine	Colouring matter? Biliary resin Cholesterine		Hematosine Fatty matters	
Colouring matter							
Lactic acid and its accompanying animal matters, according to Berzelius.			Free lactic acid	Lactic acid (in combination) and its accompanying animal matters, according to Berzelius.		Lactic acid and its accompanying animal matters (according to Berzelius).	
Sulphuric acid, phosphoric acid, fluoric acid, all in combination, as salts.			Sulphur Phosphorus	Sulphur, phosphorus, fluorine? in incidental union with animal matters.		Sulphur, phosphorus, fluorine? in incidental union with animal matters.	
Muriatic acid in combination as salts.				Muriatic acid in combination as salt.		Muriatic acid in combination as salt.	
Potash, soda, in combination with acids, as salts.			Free alkalies? Alkaline carbonates	Potash, soda, partly in union with animal matters and various acids.		Potash, soda, partly in union with animal matters.	
Lime, magnesia, (silex?) in combination with the phosphoric acid.			Lime and magnesia in excess?	Lime, magnesia, (silex?) in incidental union with animal matters.		Lime, magnesia, (silex?) in incidental union with animal matters.	

Diseased Structure of the Kidneys. — In order the better to appreciate the extent of the morbid changes in the kidney, we ought to know its standard or healthy appearance. As regards weight, we learn from Rayer that the mean weight in thirty males, from 16 years to 76 years of age, was four ounces three drachms, to four ounces and a half. The density of the organ is variable; its weight not being always proportionate to its size.

Multifarious experiments, at first by M. Comhaire in 1803, and subsequently by M. Rayer and his pupils, demonstrate the little sensibility possessed by the kidney. Hence we are bound to regard with attention any apparent trifling pain or tenderness on pressure in the region of this organ, and to endeavour to ascertain its cause. We also learn from this fact that nephritis may make considerable progress without the patient being apprised of it by pain. As regards injection of the renal tissue evincing disease, M. Rayer assures us that, whenever their anterior is more ingested than their posterior portion, in subjects who have laid as usual, on their back, this condition is to be ascribed to morbid action. He lays stress on this, because the phenomena of hypostatic engorgement of the cadaveric species is of regular occurrence in the kidneys. The assimilation of both substances, medullary and cortical, of the organ to the same colour, by imbibition of blood, when considerable, is very frequently mistaken for an effect of disease. When abdominal putrefaction advances with rapidity, the separation of the fibrous capsule is a common phenomenon, and is produced by the softening of the cellular membrane interspersed between the capsule and the substance of the organ. The alterations of colour of the kidneys are often very rapid, so that an artist intent on copying them, is sometimes greatly puzzled to catch the original one.

Maceration, although it obscures some morbid states of the kidney, renders others more evident; and of these latter are the granulations observed in Bright's disease. The impregnation of the surrounding cortical substance with water renders it semi-transparent, and so throws out the dull, milky hue of the granulations. M. Rayer describes these bodies as more distinctly visible at the anterior part of the right kidney than elsewhere; an appearance which he attributes to putrefaction commencing earliest in this portion of the organ.

Exploration. — The examination of a patient in whom we suspect disease of the urinary organs cannot be conducted with too much care. Manual examination and percussion will be found important aids. By the former the degree of sensibility of the kidneys, the extent, form, direction, mobility, and resistance of visible enlargements, may be ascertained. Percussion will aid us in making out the origin of tumours in the lumbar regions; but it is to be borne in mind that the dull sound elicited may be due to the enlargement of other solid organs. The examination should be extended to the ureters, bladder, prostate, and urethra. Important aid to diagnosis will be found in the characters of the

urine, as determined by certain chemical tests and experiments. Nor must we stop here, but, as M. Rayer has very wisely pointed out, we ought to inquire into the state of the constitution before we can safely determine the causes of the disease, or the mode of treatment advisable.

Nephritis. — A new and, we must needs regard it, improved classification of the inflammatory diseases of the kidneys, is made by M. Rayer. He divides them into three groups, as follows: — I. *Nephritis:* Inflammation of the cortical or tubular substance; being either — 1. Simple. 2. Produced by morbid poisons. 3. Arthritic, that is, gouty and rheumatic. 4. Albuminous. II. *Pyelitis:* Inflammation of the pelvis and calyces; being—1. Simple. 2. Blenorrhagic. 3. Calculous. 4. Verminous. III. *Peri-nephritis:* Inflammation of the external cellular tissue and fibrous membranes of the kidneys, or of their investing adipose cellular tissue. IV. *Pyelo-nephritis:* A combination of I. and II.

All the four species of the first group, nephritis proper, agree in commencing with partial or general hyperæmia; but they differ in respect to their symptoms and anatomical characters. A deposition of pus is a frequent termination of the *simple* species; accumulation of plastic lymph or lithic acid, in the cortical substance or mammillæ, is very often seen in the arthritic species; gangrene, more particularly, characterises the form of the disease produced by infection; whilst the most ordinary appearances in the albuminous variety are anæmia, consecutive to hyperæmia, increase in size and weight of the affected organ, and milky spots or granulations. Induration and discoloration are common to all the species except the third.

Symptoms. — Acute nephritis is generally ushered in by a chill and rigors, followed by febrile reaction. Soon there is felt pain, sometimes acute and lancinating; at others obtuse, dragging, and deep-seated, in the lumbar region. The pain may be superficial or deep-seated; restricted to a small space, or extended over a large surface; commonly increased by pressure, but sometimes so obscure as to require forcible alternate pressure on both kidneys for its development. It is increased by motion, especially when the patient is erect; by coughing, sneezing, laughing, and deep inspiration; by the efforts of defecation; and, in fine, by any strong movement communicated to the trunk; also by decubitus on the affected side, and by the heat of the bed. It is remittent, rarely pulsatile, (an ordinary symptom this in peri-nephritis,) and irradiates upwards to the diaphragm, or downwards to the bladder, groin, and testicle, or uterus and broad ligament in the female; and sometimes to the thigh; and always on the side of the inflamed kidney, if the disease be limited to one. The bladder is, unexpectedly enough, sometimes the principal if not the sole seat of the pain, in cases wherein that viscus is found to be in an almost perfectly healthy state after death, while the kidneys are seen to be profoundly disordered. This is a part of the symptomatology of nephritis worthy of dis-

tinct remembrance; as also the fact that sometimes, without pain in either organ, there is suppression of urine. After various diuretics have been given in vain, the cathether is introduced, but no urine is found in the bladder; and the patient, if a female, is supposed to be nervous. If, on general grounds, or from some suspicion of the true renal origin and seat of the complaint, venesection is ordered, or cups to draw blood over the lumbar region, and purgative medicines afterwards given, relief is soon procured. The suppression of urine may, however, as I have seen it within my own observation and practice, return before long, and without febrile action or pain. But the same treatment as before is followed by the same beneficial results.

Among the sympathetic phenomena of nephritis we notice retraction of the testicle, and numbness of the thigh on the same side with the kidney; nausea, vomiting, borborygmus, constriction at the epigastrium, wandering pains of the abdomen, tumefaction of this region, diarrhœa with tenesmus, dryness of the tongue, thirst; a pulse hard and full, sometimes small and intermittent. The skin is dry and burning; but occasionally covered with sweat, which, if there be suppression of urine, is often of an ammoniacal odour. Occasionally, nephritis gives rise to hiccup, laboured respiration, headache, and sleeplessness. The predominance of gastro-intestinal disorder is such, in some cases of nephritis, that it may sometimes impose on us as the chief and primary disease, without a minute attention to the organic derangement of the kidneys themselves.

The pain in nephritis is distinguished from that caused by calculi, in the latter being acute, pungent, and lancinating; in its coming on suddenly, and disappearing in the same way; in its following the course of the ureter; being lessened in some positions and increased in others. The diagnosis will be still more certain when the urine is suddenly suppressed with the pain, and as suddenly flows with its disappearance; and especially if small, gravelly particles are seen at the bottom or on the sides of the chamber utensil. In puerperal women nephritis has a marked tendency to terminate in suppuration, and hence the necessity in their case of early recourse to the lancet, even though the pain be not violent. The lumbar pain which the disease induces may naturally be mistaken for labour.

The symptomatology of nephritis is incomplete unless careful observation be made of the secretion from the kidneys, — as to its quantity, appearance, and composition. The secretion of urine is always diminished in quantity in this disease, and sometimes it is wholly suspended, — where both kidneys are inflamed. The urine may be excreted rarely, as twice or thrice in the twenty-four hours, or there may be distressing micturition. Its colour is of a deep red, approaching to that of blood and water. The chief changes, in point of composition, are stated by M. Rayer to be caused by impregnation with blood or albumen, by diminished

acidity, neutral reaction or alkalescence, and occasionally by admixture with pus. A white and homogeneous compound is sometimes deposited; and in all cases of calculi, there are also deposited small, irregular shaped, gravelly, or sabulous particles. We must receive with some mistrust the assertion that albumen is found not only in the traumatic variety of nephritis, but that it may also occur when the attack proceeds from general causes, or diseases of neighbouring parts. Its appearance is, however, accidental and temporary, and may be completely put a stop to — unless when dependent in part on a coexisting affection of the bladder or urethra — by venesection. In the true albuminous nephritis, (Bright's disease,) the presence of albumen in the urine is a constant condition at all periods; and not to be removed by bloodletting.

Anatomical Lesions. — General or partial increase of size; the kidney is also red and injected both superficially and deep-seated: induration, red or anæmic, coexisting with increased weight and size; giving, when both kinds of colouration exist, a maculated appearance; collections of pus, especially in the cortical substance; infiltration with the same fluid; ulceration at the mammillæ; gangrene, but this is extremely rare. Deposition of discoloured fibrin instead of pus is seen in the traumatic variety.

Causes. — Age has a modifying influence in the occurrence of nephritis, for although it has been seen in every period of life, yet it is more commonly met with in the maturity of adult age, than in old men and children. It is rare to find it in this last class under seven years of age. It is, also, more common in men than in women, and in those of a sanguine temperament than others. Children of gouty or rheumatic parents are liable to nephritis. Its greater frequency in cold and damp climates than in warm ones, is a fact of familiar remark; but in this estimate we must take account of the much larger use of distilled and fermented liquors by the inhabitants of the former than the latter; which alone is a common, perhaps the most common cause, not of a traumatic nature, of renal disease in general.

The most direct and the most frequent causes of acute nephritis are contusions and wounds of the kidneys, and the irritation of foreign bodies, such as calculi, worms, or urine unduly retained in the excretory passages, and more particularly in the pelves of the kidney. All morbid states inducing retention are indirect causes of renal inflammation; whether they be inflammation of the ureter, prostate, urethra, and bladder, or displacements and diseases of the uterus, ovaries, rectum, &c. Paralysis induced by cerebro-spinal effusion or compression will, also, give rise to nephritis. Violent movements or shock, by running, leaping, riding on rough roads, are occasional causes of the disease. Various irritants, the operation of which is more particularly directed to the urinary apparatus, are commonly mentioned as often causing nephritis; such are cantharides, oil of turpentine, narcotic acids, &c., but

their power in this respect is no doubt overrated, and by some (*Christison*) is entirely denied. Under circumstances of predisposition, gouty or rheumatic, a sudden stoppage of perspiration, or a debauch will bring it on; as will also the irritation of calculi: the sudden disappearance of arthritic gout or rheumatism may be followed by nephritis.

The disease may exist in very different degrees in the two kidneys, even where the cause has been common to both, such as exposure to cold and dampness, the action of cantharides, &c. Inflammation of one kidney caused by topical cause, as a bruise, will produce an evident effect on the other, manifested by a material diminution if not suspension of the urinary secretion.

Chronic nephritis is not marked by many diagnostic symptoms. M. Rayer assures us that habitual pain in one or both renal regions, coexisting with diminished acidity, neutral reaction, or more especially alkalescence of the urine, and a sensation of weakness and numbness in the lower extremities, constitute the principal characters of chronic nephritis. But this opinion must be largely qualified when we learn that, in a great number of cases, we can hardly suspect the existence of the disease, unless on the evidence of a most minute examination of the urine. Chronic nephritis is most intimately connected with the generation of phosphatic calculi. "The urinary sediment in chronic nephritis, when the fluid itself is alkaline, is either amorphous, and composed almost wholly of phosphate of lime, or chiefly constituted by crystals of ammoniaco-phosphate of magnesia; or, as most commonly happens, both these salts are held in suspension, together with globules of mucus and a small quantity of lithates. The contents of the bladder are, in ordinary cases, excreted frequently, and in small quantities at a time. Impregnation with blood or albumen is rare in the uncomplicated disease, with mucus frequent, and with pus indicative of inflammation of the mucous membrane of the passages." (*Brit. and For. Med. Rev.*, vol. viii.)

The diagnosis of this affection is occasionally confirmed by the good effects of local depletion; as when, after cupping on the loins, the renal pain and the turbidity and alkalinity of the urine not unfrequently disappear altogether. Fever is generally absent, but the disease is attended with progressive marasmus and a general cachectic habit, which M. Rayer believes to favour the development of pulmonary tubercles.

The *anatomical lesions* in chronic nephritis are often not materially variant from those of the acute disease. More commonly, however, we meet with diminished size of the kidney; but sometimes hypertrophy with increased weight and hardness of tissue; granulated, rough, or tuberculated exterior: red injection, but this we may suppose to be present as a result of an acute attack just before death: anæmia, partial or general, ordinarily attended with augmented density and in many cases with hyperæmia: a peculiar species of atrophy, of which one of the most remarkable characters consists

in the appearance of cicatrices on the outer surface of the organ; and, finally, ulceration of, or purulent collections in, the mammillæ. Their investing membranes frequently participate in the inflammation affecting the organs themselves, — their vessels rarely.

The *causes* of chronic nephritis are the same as those of the acute; but the chief influential ones are irregularity and excesses in food and the free use of alcoholic drinks, which are rendered doubly pernicious by interruption of the cutaneous function through cold and moisture.

Treatment of Nephritis.—Acute nephritis requires the antiphlogistic treatment to be carried out to its full extent. Venesection to the amount of twenty-four or even thirty-six ounces ought to be practised at once, and in a short period repeated, to the amount required by the violence of the inflammation. In aid of this means, leeches ought to be applied to the lumbar regions, over the kidneys, or cupping practised in the same place, in order to abstract blood to the extent of at least twelve ounces. Laxatives should always be preferred to purgatives; and castor oil, or rhubarb and magnesia, are to be given to the exclusion of saline medicines; and, after all irritating matters are removed from the intestinal canal, enemata will suffice for evacuating the lower bowels. Warm water as an internal fomentation of the colon acting sympathetically on the kidney, and afterwards some preparation of opium, may advantageously follow as enemata. Immersion in a warm bath for half an hour at a time, and the administration of mild diaphoretics, of which Dover's powder is the best, are exceedingly useful adjuvants to the evacuating plan. Among the direct reducers of inflammation, calomel and tartar emetic are entitled to a place after general and local bloodletting. Opium may be combined with both of them, in order to aid their sedative effect, and to prevent the nausea which is apt to ensue immediately after the use of tartar emetic, and more remotely after calomel. So long as the renal inflammation is high, both these medicines will be tolerated in large doses without inconvenience. The probability of ptyalism from the free use of the calomel will be abated by encouraging the peristaltic motion of the bowels, by simple watery or mucilaginous enemata.

Counter-irritation will be usefully induced by warm pediluvium, or even the warm hip-bath, and by frictions of the feet and lower extremities generally, and with stimulating liniments. Difference of opinion prevails on the subject of the quantity of drink to be allowed to a patient labouring under nephritis. Some would withhold it altogether, or give it in very small quantity, on the plea that the kidney ought to be tasked to as little secretory effort as possible when it is inflamed; and if possible its function suspended when the ureter is obstructed with calculus. But, on the other hand, it is generally admitted, that the smaller the quantity of urine, the more concentrated it is, and more abounding in saline and other stimulating ingredients; and hence the advantage of free dilution to obtund, as it were, the acrimony of the urine, and, in fact, to render the task of

the kidneys themselves easier by increasing the proportion of water in the blood brought to them.

There is scarcely any of the phlegmasiæ in which opium in full and repeated doses is so much relied on as in nephritis. Its use may follow directly venesection, especially if this latter be carried so far as to cause faintness, or it may be given at intervals throughout the whole period of the complaint, in conjunction with the other remedies already mentioned.

In *nephralgia*, the symptoms of which are chiefly measured by pain, unaccompanied by fever, but with greater sympathetic disturbance of the bowels, opium is the chief remedy, and more particularly when the pain is kept up by the retention of a calculus in the pelvis, or in the ureter.

The *treatment of chronic nephritis* is not materially different from that demanded in the acute form. Depletion is not required to the same extent, but its repetition is somewhat more called for; and the use of purgatives is not only admissible but decidedly efficacious. Narcotic diuretics, such as digitalis and colchicum, with the alkalies, and particularly the liquor potassæ, by some recommended in the acute form of the disease, are also called for in the chronic. Mineral acids often prescribed in chronic nephritis with alkaline urine are strongly protested against by M. Rayer. Greater reliance, however, is placed on counter-irritation by tartar emetic plaster on the loins, or by caustic or seton to the same part. Blisters are generally objected to; but unless the patient be constitutionally prone to be irritated by them, their use need not be withheld.

The *diet*, which in acute nephritis is of the simplest kind, consisting indeed almost wholly of diluent and demulcent drinks, may be more nutritious in the chronic variety. M. Rayer counsels the moderate use of animal food at this time. Attention to the cutaneous function, and preserving an equable temperature of the skin, is of the very last importance for the entire recovery from acute nephritis and the prevention of a relapse.

When nephritis occurs as a consequence of the retention of urine, produced either by urinary or cerebral disease, it will be necessary to evacuate the bladder regularly. This is best done by introducing the catheter at proper intervals, instead of allowing it to remain in the bladder; a not uncommon, but a hurtful practice. One of the most troublesome and dangerous forms of nephritis is that occurring after other diseases, and, according to the classification of M. Rayer, the product of animal poisons. The most marked, or perhaps I should say, the most common instance, is nephritis occurring in typhous and typhoid fever, owing, as we are told, to retention of urine. Without denying that this is a contributing cause, I am inclined to believe that the kidneys become affected in the progress of the fever, as the lungs, or the brain, or spleen is known to be, viz., deeply congested, and to a certain extent inflamed; and hence a suspension of their secretory function.

LECTURE LII.

DR. BELL.

BRIGHT'S DISEASE, or *Granular Degeneration of the Kidney.—Renal dropsy*—Its organic seat, common accompaniments and constant symptoms.—*Symptoms.*—History of the disease—Acute form of the disease; is short, and not often seen—Anasarca soon appears—Acute affection a sequence of scarlatina—Albuminous urine, how far a characteristic symptom—Properties of the urine in this disease—Tests of albumen in the urine—Blood; its appearance and composition. —*Secondary diseases*—Anasarca most common; next, ascites—Morbid state of the heart—Albuminous urine from diseased heart alone—Phthisis—Diarrhœa very common—Cerebral disease and meningeal inflammation with effusion—Pregnancy developing Bright's disease—Exanthematæ—particularly scarlatina gives origin to it—*Anatomical lesions*—Summary by different observers—Precise state of the kidney; congestion with inflammation—Mr. Robinson experiments—Mr. Rayer's opinion—Dr. Burbridge's views.—*Causes*—Predisposition by particular constitution, and especially intemperance—Exciting causes—cold and dampness.

TO-DAY I have to direct your attention to one of the achievements of modern pathology, in its revealing to us, with singular precision, the organic cause of a great number and variety of disorders which have hitherto been regarded as separate or merely functional ones. The discovery is of a peculiar structural alteration of the kidney and accompanying constitutional disorders. The disease was first made known by Dr. Bright; and since farther explained by other distinguished pathological physicians; but by no one with so much fulness and detail, and with the introduction of so large a body of original and collected matter, as by M. Rayer. It has various names, viz., BRIGHT'S DISEASE — *Albuminous Nephritis* (Rayer); *Granular Degeneration of the Kidney* (Christison); *Albuminuria* (Martin Solon — Forget); *Mottling — White Degeneration — Contraction — Granulation.*

The most obvious anatomical lesion of the kidneys in this disease consists in a granulated appearance of the cortical part; the most obvious and most common morbid accompaniment in the system at large is anasarca, or some form of dropsy, and the almost invariable symptom is albuminous urine. If a principal and almost constant symptom, after the old fashion, as that of anasarca, were to justify a name, we should call it *renal dropsy.* By its dropsical symptoms, indeed, the disease will, for the most part, first arrest your attention. I cannot give you a better idea of the general and frequently also anomalous features of this disease, than in the very words of Dr. Bright himself (*Guy's Hospital Reports*, vol. i.).

Symptoms.—"The history of this disease, and its symptoms, is nearly as follows:—

"A child, or an adult, is affected with scarlatina or some other acute disease; or has indulged in the intemperate use of ardent spirits for a series of months or years: he is exposed to some casual cause or habitual source of suppressed perspiration: he finds the

secretion of his urine greatly increased, or he discovers that it is tinged with blood; or, without having made any such observation, he awakes in the morning with his face swollen, or his ankles puffy, or his hands œdematous. If he happen in this condition to fall under the care of a practitioner who suspects the nature of his disease, it is found that already his urine contains a notable quantity of albumen: his pulse is full and hard, his skin dry, he often has headache, and sometimes a sense of weight or pain across the loins. Under treatment more or less active, or sometimes without any treatment, the more obvious and distressing of these symptoms disappear; the swelling, whether casual or constant, is no longer observed; the urine ceases to evince any admixture of red particles; and, according to the degree of importance which has been attached to these symptoms, they are gradually lost sight of, or are absolutely forgotten. Nevertheless, from time to time the countenance becomes bloated; the skin is dry; headaches occur with unusual frequency; or the calls to micturition disturb the night's repose. After a time the healthy colour of the countenance fades; a sense of weakness or pain in the loins increases; headaches, often accompanied by vomiting, add greatly to the general want of comfort; and a sense of lassitude, of weariness, and of depression, gradually steal over the bodily and mental frame. Again the assistance of medicine is sought. If the nature of the disease is suspected, the urine is carefully tested; and found, in almost every trial, to contain albumen, while the quantity of urea is gradually diminishing. If, in the attempt to give relief to the oppression of the system, blood is drawn, it is often buffed, or the serum is milky and opaque; and nice analysis will frequently detect a great deficiency of albumen, and sometimes manifest indications of the presence of urea. If the disease is not suspected, the liver, the stomach, or the brain divides the care of the practitioner, sometimes drawing him away entirely from the more important seat of disease. The swelling increases and decreases; the mind grows cheerful or is sad; the secretions of the kidney or the skin are augmented or diminished, sometimes in alternate ratio, sometimes without apparent relation. Again the patient is restored to tolerable health; again he enters on his active duties: or he is perhaps less fortunate; — the swelling increases, the urine becomes scanty, the powers of life seem to yield, the lungs become œdematous, and, in a state of asphyxia or coma, he sinks into the grave; or a sudden effusion of serum into the glottis closes the passages of the air, and brings on a more sudden dissolution. Should he, however, have resumed the avocations of life, he is usually subject to constant recurrence of his symptoms; or again, almost dismissing the recollection of his ailment, he is suddenly seized with an acute attack of pericarditis, or with a still more acute attack of peritonitis, which, without any renewed warning, deprives him in eight-and-forty hours of his life. Should he escape this danger likewise, other perils await him; his headaches have been observed to become more frequent; his stomach more deranged;

his vision indistinct; his hearing depraved: he is suddenly seized with a convulsive fit, and becomes blind. He struggles through the attack; but again and again it returns; and before a day or a week has elapsed, worn out by convulsions, or overwhelmed by coma, the painful history of his disease is closed."

Granular disease of the kidneys, in its acute form, often eludes observation, or rather it is mistaken for simple nephritis, to which its symptoms have a close resemblance; and it is not until it has passed into its sub-acute or chronic state, that it more pointedly fixes the attention of the physician. Even at this time it is referred to some other morbid derangement than that of the kidneys; as may be inferred from the preceding description of it by Dr. Bright, who himself only recognised it, at first, in this state. It is seldom that the lumbar pain or uneasiness, fever, and albuminous and scanty urine are long present before anasarca is formed. Frequently, this affection appears in the course of the first or second day, and it commonly puts on the character of inflammatory dropsy, one external feature being an absence of pitting of the swelling on pressure. Most generally, as Dr. Christison observes, the acute symptoms give place to those of the chronic form of the disease, which runs its own proper course. The only invariable character which he admits of the acute form, is scanty, highly coagulable urine, with more or less fever. More especially is its value evinced in the clear light which it throws on the most common form of dropsy, and on the nature of dropsies in general. These symptoms may prevail alone for a few days, till coma and convulsions suddenly occur, and prove quickly fatal.

The acute affection has most frequently been witnessed in children as a sequence of scarlatina, especially, according to M. Rayer, in certain epidemics of this disease; but it also occurs in adults independently of any exanthematous disorder, and notably in various diseases of the kidney (not granular), and of the bladder. Dr. Christison on this point, as to the indications derived from the presence of albumen, says: "it appears unquestionable that certain kinds of food may occasion its appearance in the urine of some people; that it may be produced there by certain poisons that act on the kidneys; occasionally by true nephritis, always more or less by pyelitis; rarely by tubercles; often by carcinoma; often by scurvy and by purpura; seldom during the crisis of acute inflammatory diseases or continued fever. Simply and abstractedly, therefore, it is not a proof of granular disease being present in the kidney; but it is far more frequently produced by granular disease than by all other causes put together; and no other cause yet ever known occasions so large a proportion in the urine as is generally seen in the early stage, and sometimes, too, in the chronic form of the disorder; so that urine, at least *moderately coagulable*, according to the definitions given above, probably always indicate granular derangement." (*A System of Practical Medicine*, &c.)

The urine in the acute stage is always acid, and voided in small

quantity: its colour is variable; sometimes of a reddish or deep-brown, depending on the presence of more or less blood; but more frequently, as the disease advances, it is of a yellowish or greenish-straw colour, like whey, not strained, and in all cases it is more or less turbid (Tissot—*Dissertation*, 1833). This opaline turbidity, as it has been aptly termed by Christison, is not removable by repose; and arises from modified mucus, in the microscopic scales of the epithelium of the urinary mucous membrane: in rare cases strings of viscid mucus are seen. This turbidness may also proceed from globules of fatty matter being suspended in the urine. Urinary depositions are not common; yet both lithic and phosphatic amorphous sediments may be occasionally observed. Examined under the microscope, the urine in the first or acute stage of the disease is seen to contain blood-globules in numbers, occasionally mucous globules, and always lamellæ of epithelium. The density of the urine is affirmed by M. Rayer to be above the healthy standard, or 1.028, while Dr. Christison tells us that it is much below or between 1.007 and 1.011, and in a few cases as low as 1.004, rarely above 1.014. But there must be differences in this respect according to the period of the disease at which the examination is made. Albumen is commonly present, and in such quantity, according to Dr. Christison, as to occupy, when coagulated and allowed to rest, between a fourth and an eighth of the volume of the liquid. The quantity decreases generally with the advance of the disease, unless an occasional acute attack supervene in the chronic stage. The daily solids of the urine are reduced in quantity; the diminution seeming to affect all the principles of the urine indiscriminately.

The calls to urinate are more frequent than in health, and the quantity of urine discharged is at first nearly natural; but as the disease advances, and especially if it approach a fatal termination, it falls far below the common standard; and in some cases, only one or two ounces are passed daily for many days consecutively.

The tests of albumen in the urine have been stated before to be, first, heat alone, and then nitric acid: either causes a curdiness, a coagulum, and then precipitation. To these we should add non-precipitation by acetic acid. Tissot attaches much importance to physical signs, viz., a number of bubbles, which remain on the surface of the urine and on the sides of the vessel in which it was received, so much longer than those casually made in common urine. By stirring the urine, or better still, by blowing in it through a tube or common reed, a great quantity of these bubbles, like soap bubbles blown by children in their sports, was developed, if the urine was diseased. In healthy urine the bubbles thus made are smaller and soon disappear.

The great importance of the albuminous test of renal disease, particularly in connexion with dropsy, renders it desirable that we should be able to ascertain its presence in the urine with readiness and certainty. The means for us to do this have just been mentioned; but some additional particulars may now be appropriately

subjoined. In the first place, however, we ought to be aware of the fact, as pointed out by Dr. Wells, that the effects of reagents are not the same on albumen contained in water and in urine. "It must also be remembered that, if alkaline urine be rendered turbid by heat, the loss of transparence is usually due to the precipitation of phosphates, as is proved by its complete restoration on the addition of nitric acid. For this fact we are indebted, we believe, to Mr. Rees. On the other hand, precipitation by nitric acid alone will not prove the matter thrown down to consist of albumen; such precipitate may be composed of lithic acid, or of lithate of ammonia." And an additional source of error is, in attributing the character of albuminous coagula to a precipitate of lithate of ammonia, which may become soluble in an excess of acid.

The examination of the suspected urine should be made repeatedly, because sometimes the albumen disappears for a time. It is necessary, as Dr. Christison very properly remarks, to attend to the proportion of the albumen, both with a view to the prognosis and the treatment. "For this end, it should be coagulated in a tube, and left at rest for twenty-four hours; upon which the following degrees of coagulability may be noted: gelatinous by heat; very strongly coagulable, where a distinct precipitate separates, occupying the whole fluid; strongly coagulable, where it occupies half the volume of the fluid; moderately coagulable, where it occupies a fourth of the fluid; slightly coagulable, where it occupies an eighth; feebly coagulable, where it occupies less than an eighth; and hazy by heat, where a turbidity is occasioned without visible flakes."

The appearance and composition of the blood in granular disease of the kidney, are points of considerable interest; although we must regret that they are not as fully ascertained by the different writers on the subject as we could wish. The frequency of the buffiness of the blood in the first stage of the disease is noticed with considerable unanimity. The serum is diminished in its specific gravity owing to the loss of its albumen, and it may fall from 1030, the average healthy standard, to 1022, or even 1019. After venesection, if the urine is rendered thereby less albuminous, the natural state of the urine may return. Sometimes the latter is lactescent from admixture with fatty matters, removable by sulphuric ether. The quantity of urine is increased, and also that of fibrin, according to Dr. Christison. With the progress of the disease the blood undergoes farther alteration, but the quantity of crassamentum is diminished and that of serum increased: the specific gravity of this latter is also larger, and even may exceed the common standard. The proportion of globules is greatly diminished, and the reduction increases as the morbid change of the kidney advances. "Probably," says Dr. Christison, "no other disease except hemorrhage occasions so great an impoverishment of the colouring matter of the blood. The healthy proportion in a stout male being about 1340 grains in 10,000; it has been found reduced

in granular disease of the kidney, according to its stage, to 1110, 955, 720, 564, and even 427.

Secondary Diseases. — Anasarca is an almost invariable attendant on granular disease of the kidney; so much so, that it is regarded as a characteristic symptom. But there are instances in which the renal affection lasts for a long time without dropsy. It was this latter, however, which first drew the attention of Dr. Bright to the disease of the kidneys. He found it to prevail in twenty-three out of twenty-four cases of this latter; Rayer, in 16 out of 17. The form it most generally assumes is anasarca, attended with more or less effusion into the great serous sacs, and into the pulmonary cellular tissue. M. Rayer's experience, as repeated by M. Tissot, leads him to believe that ascites is the most common. Most cases of what are called inflammatory dropsies, as well as those following scarlatina, depend on disease of the kidneys. So, too, are most, if not all, cases attended with diuresis, provided the urine be not saccharine. A writer, to whom I have been so largely indebted in my summary of opinions, particularly those of M. Rayer, on all the diseases of the kidneys of which I have hitherto spoken, asserts that anasarca is scarcely a less frequent attendant on the renal lesion now before us than, for example, cough in phthisis (*Brit. and For. Med. Rev.*, vol. x.).

Diseases of the bladder, prostate, and urethra, have, in M. Rayer's opinion, little or no influence over 'albuminous nephritis' — granular disease of the kidney; and he has found that the latter rarely induces inflammation in the pelvis and ureters, and still more rarely in the bladder. Diabetes may, he thinks, have some influence in its production.

A very frequent accompaniment of Bright's disease is a morbid state of the heart; Dr. Bright having found sixty-seven cases of cardiac affection — hypertrophy with or without valvular lesion — in one hundred of renal degeneration. This gentleman drew a hasty inference, that the latter always preceded and acted as a cause of the former. M. Rayer, on the contrary, believes that the disease of the kidney is very frequently produced by that of the heart, and he has seen slight albuminuria in subjects affected with hypertrophy or valvular lesions, gradually becoming intensely marked, and attended with the most distinct evidence of the special renal affection. But it must be added, that there is albuminous urine in cases of disease of the heart or large vessels without renal or Bright's disease; and hence we are assured also of another fact, that this character of urine is not always the sign of disease in the kidneys. M. Forget, of Strasburg, in the *Gazette Médicale de Paris*, Sept. 1837, relates a case of a middle-aged woman, who died from disease of the heart, (this organ was hypertrophied, and the mitral valve particularly was ossified and contracted,) but the kidneys were perfectly sound. The most obvious disorders during life were anasarca and ascites, and the passage of albuminous urine. This

writer gives several cases showing the coexistence of disease of the heart with that of the kidneys and dropsy. Dr. Darwell had before this time pointed out the fact, that the urine of patients labouring under heart disease might have albuminous urine with sound kidneys, or with simple hyperæmia of these organs.

Catarrh or bronchitis is noticed by the writers on the present subject, to whom I have chiefly referred, as an extremely frequent secondary disease to that of Bright's. Dr. Osborne (*On the Nature and Treatment of Dropsical Diseases*), found that bronchitis prevailed in eighteen cases out of thirty-six, whose histories he was acquainted with. It is often associated with emphysema, and leads to pulmonary œdema, or, as some allege, lobular pneumonia. "It is occasionally acute, much more frequently chronic. It is often enough cured, yet it is frequently obstinate, and in many instances it is the immediate cause of death. Few survive long if it be obstinate, more especially where extensive anasarca concurs, and the primary disease has made some progress." (*Christison, op. cit.*)

There would seem to be an occasional connexion between phthisis and granular disease of the kidney; the latter sometimes occurring as secondary to the former; and at other times pulmonary consumption seems to have arisen from the deterioration of the constitution by Bright's disease. Various affections of the stomach may attend the disease; such as dyspepsia and chronic vomiting. Diarrhœa is a very common secondary disorder. M. Rayer saw it in upwards of half his patients; it was remarkable for its intractability, and for its never lessening, no matter how profuse it is, the amount of dropsical effusion. On the contrary, and the observation is not new to those conversant with dropsical diseases, although they may have been ignorant of their organic origin, the effusion seemed to increase with the aggravation of the diarrhœa. Between liver and kidney disease there has been occasionally noted a connexion, but it is not well defined.

Cerebral disease, in various forms, is of occasional occurrence in granular kidney. Sometimes an apoplectic attack supervenes suddenly, and proves quickly fatal; but this is far from being a frequent result. In general, the head affection comes on in the insidious form of increased drowsiness, and perhaps some bluntness of the mind and obliteration of the senses; but it must at the same time be borne in mind, that coma is not necessarily connected with the extent or increase of dropsical effusions. Dr. Osborne speaks of arachnitis as a common disease under these circumstances; and Rayer, of sub-arachnoid serous infiltration as the lesion most commonly discovered, along with occasional superabundance of fluid in the ventricles. Dr. Barlow has obtained urea from this fluid. Hemorrhages into the substance of the brain, into the ventricles, or the cavity of the arachnoid, have been noted by Dr. Bright; but, after all, M. Rayer thinks them so rare, that he doubts there being any real dependence between the two states of cerebral hemorrhage and renal lesion.

Several examples of Bright's disease have been observed by M. Rayer, as among the apparent effects of pregnancy. "Some of these cases were remarkable for the facility with which the disease yielded after delivery to very simple treatment. In certain instances where the disease preceded, or was developed at an early period of pregnancy, it evidently interfered with the evolution of the ovum, and in cases published both by M. Martin-Solon and himself, led to fatal abortion."

The occasional dependence of granular disease of the kidney on the exanthematæ, and particularly scarlatina, has been dwelt on both by Bright and Rayer. Dr. Bright considers scarlatina "as often laying the foundation for the future disease, or as an evidence of the strong tendency existing in the constitution, even when the cure has been apparently complete." At a subsequent date (*Reports, &c.*) he remarks:—

"During the autumn and winter which have just passed (1839–40), we have experienced an almost epidemic prevalence, in London and its neighbourhood, of that anasarca with albuminous urine which has been long known to accompany or follow scarlatina. The attack of the original disease has often been slight; the rash sometimes scarcely perceived; the sore throat often mild; and the affection of the urine has frequently shown itself while the rash or sore throat has still existed. Hæmaturia has occasionally occurred during the severity of the attack; but more commonly this symptom, with or without anasarca, has followed on the subsidence of the fever, or during the early convalescence. The number who have offered themselves as out-patients, or have been admitted into the wards of Guy's Hospital, under such circumstances, as well as the cases which have occurred in private practice in other parts of London, have been quite unprecedented, within the limits of my experience."

Anatomical Lesions in Bright's Disease. — A clear and more connected, and at the same time historical view of the morbid changes in the kidney, altered by albuminous inflammation, or in Bright's disease, will be procured by your having placed before you, as I do now, "the similitudes and differences in the descriptions of the few observers who have made them a subject of special study," displayed "in a condensed form in juxtaposition." Here, again, I must acknowledge my obligations to the able writer in the *British and Foreign Medical Review* (vol. x.), to whom I have so often referred before.

BRIGHT. (1827.)

Chronic.

1*st Form.* The kidney looses its firmness, acquires a yellow or mottled appearance externally; the same yellow colour, slightly tinged with gray, pervades the cortical substance; the tubular is of lighter colour than natural; the size of the kidney, not materially altered; there is no morbid deposit.

2*d Form.* The whole cortical part is converted into a granulated texture, with copious morbid interstitial deposit of an opaque white substance; the kidney is generally enlarged, sometimes very much so. (The granulations are rendered more apparent by maceration.)

3*d Form.* The kidney is quite rough, and scabrous to the touch externally, and is seen to rise in numerous projections of about the size of a large pin's head, of yellow red and purplish colour. The form often inclined to be lobulated, the feel hard, the texture of semi-cartilaginous firmness: tubular portions appear drawn near to the surface of the kidney.

RAYER. (1837.)

Acute.

1*st Form.* Kidneys enlarged, their weight may reach 12 oz.; firm but not hard; surface of a morbid red colour and studded with small deep red points; Internally, the increased size is found to depend on the cortical substance which presents a great number of similar points, apparently the Malpighian glands injected. Tubular cones of duller red colour, and their striæ less distinct than natural; pelvis and calyces injected.

2*d Form.* The enlargement persists, with slight diminution of consistence; tendency to lobulation is often observed; mottled appearance from red spots on a yellowish-white ground (mixture of hyperæmia and anæmia). On division, the cortical substance appears swollen and of pale-yellowish tinge, speckled with red; the tubular of a rather bright brownish-red.

Usually Chronic, rarely Acute.

3*d Form.* Size and weight increased as before; no mottling; cortical substance externally, and on section appears of a pinkish-white and slightly yellowish hue, or paler, and like that of eel's flesh. Small vascular arborizations; and sometimes large white granulations resulting from deposition of plastic lymph.

4*th Form.* Size and weight as before; external surface smooth, of pale yellow colour, speckled or covered with milky-white spots as large as the head of a very small pin; these are found also in the interior of the cortical substance (which is of the same pale colour as in the two previous forms), and aggregated into flocculent streaks.

Chronic.

5*th Form.* Rarer than the preceding; kidneys as before in point of size and weight; lobules unnaturally distinct; the external surface appears as if a vast number of "grains de semoule" were deposited under the cellular capsule of the organ.

6*th Form.* The kidney is sometimes larger but often smaller than in health, is hard, and presents inequalities or mamillæ on the surface, few or no milky spots (Bright's granulations), but commonly some of these in the interior of the cortical substance. Capsular membrane almost always thickened and very adherent.

MARTIN-SOLON. (1838.)

1*st Degree or variety.* Kidney red, hypertrophous, enlarged and heavy — especially cortical substance; the tubular is also of deep red colour, but not hypertrophous; the blood combined with these tissues cannot be removed by washing; the renal substance is friable and marked with red or blackish stellate points — probably ecchymoses.

2d. Tissue, still hypertrophous, presents a yellowish striated or mottled appearance; the sulci marking the divisions of the kidney in infancy are sometimes manifest; the tubular substance is slightly hyperæmic.

3d. Kidney almost always hypertrophous, a state still depending on cortical substance: the external surface, generally smooth, sometimes presents inequalities. Surface of a pale-yellow hue, something like that of the pancreas, as likewise is the substance of the kidney internally; the cortical substance appears to penetrate between the radii of the tubular; and these latter have in some measure disappeared, or tend to become of pallid colour. The tissue is soft, but to a certain degree friable, though it resists laceration somewhat.

4th. The kidney presents the yellow appearance just described; and besides white, pultaceous, creamy particles, apparently produced by interstitial exhalation on the surface and in the substance of the organ (Bright's granulations).

5th. Kidney, in addition to the anatomical characters of Bright's disease, contains some form of adventitious product (cyst, tubercles, carcinoma, &c.).

CHRISTISON. (1839.)

1. *Incipient Stage.* A minor degree of the second stage,— namely, of the deposition of a grayish-yellow, obscurely granulated matter in the cortical structure, with or possibly without some degree of sanguineous congestion.

2. *Middle Stage.* The deposition of granular or cheese-like matter, the only important and well-established anatomical character of the morbid formation, seems at first to be, for the most part, chiefly confined to the cortical substance.

3. *Advanced Stage.* The morbid deposition gradually pervades the tubular substance.*

* Dr. Christison also believes that the following appearances "ought to be distinguished with the view of afterwards tracing their relationship. 1. Congestion of the kidneys with or without some granular deposit in their substance. 2. True granular degeneration of the cortical or tubular structure; *a*, finely granular; *b*, botryoidal. 3. Degeneration by a smooth, homogeneous, yellowish-gray mass intermediate in consistence between that of the liver and that of the brain. 4. Disseminated tubercles. 5. Induration of semi-cartilaginous hardness. 6. Atrophy with disappearance of the proper renal structure, and with or without one of the previous morbid states. 7. Simple anæmia."

"Now, it must be admitted that the gradations of diseases here described seem naturally and closely connected, as far as the fourth; and though it may be difficult to demonstrate the link between the yellowish discolorations, &c., and the deposition of the granular matter, the fact is no less important that such deposition does not probably occur until the tissue of the kidney has, with greater or less rapidity, passed through the previously described phases. Should a suspicion arise that accuracy has been sacrificed to zeal for systematic arrangement, this may be dismissed with the reflection that each of these forms of disease with its special characters has repeatedly been observed by writers who entertained no particular view respecting the mode of relation of the series. The sixth stage of M. Rayer, acknowledges its connexion with its predecessors by the occasional presence of the milky granulations.

Such then may, in the present state of knowledge, be fairly admitted to be the mode of progress of this disease under ordinary circumstances, and when its evolution is regularly accomplished. But it must not be forgot that, in many instances, we are without any direct proof from anatomy, or collateral evidence from symptoms, that the disorder has originated in active congestion: the morbid changes appear indeed to advance so insensibly as almost to exclude the notion of an irritative process having existed in the affected organ."

As regards the precise state of the kidney giving rise to albuminuria or Bright's disease, the probability is, Dr. Christison thinks, that congestion, or even reaction in the kidney, precedes, in the acute stage, a peculiar morbid deposit; but that this last, or the chronic form, is made without any such precursor; that as the deposit increases, the healthy texture of the kidney begins to be absorbed; that after a time, although the absorption of the healthy structure goes on, the formation of the morbid deposit often ceases; and that possibly this deposit is sometimes absorbed in its turn.

Mr. Robinson, in a *Memoir on the Pathology of Granular Disease of the Kidney*, has endeavoured to prove, "that the acute stage of writers is simply acute nephritis, and that all the varieties of morbid appearances occurring in the febrile stage may be considered as resulting from so many different degrees in intensity and duration of chronic inflammation of the kidney." Mr. Robinson, in confirmation of this view, might have referred to the result of M. Rayer's experience, which points to "the striking analogies between simple and albuminous nephritis. The action of cold and damp produces both diseases. In the acute stage, (with the exception of the deposition of pus, which has either not been observed at all, or at least very seldom, in Bright's disease,) the anatomical characters are identically the same — the injection of the kidneys, their increased size, yellow discoloration, &c., are all appearances common to both maladies. In the most advanced chronic stage, the lesions are so precisely similar, that were it not for several circumstances connected with the progress of these affections, the absence or presence of dropsy, and the constant or only occasional presence of albumen in the urine, it would be impossible to distinguish them from each other."

Mr. Robinson advances another proposition: — "That the presence of albumen in the urine is produced by, and its proportional quantity is in direct ratio to the degree of, congestion of the capillaries of the kidney, from whatever cause that congestion may arise." He confirms this view by several experiments on rabbits, in which he tied the emulgent vein of one side, after exposing the kidney; and, after the lapse of a period, varying from ten minutes to an hour, the animal was killed. The urine on being tested by heat and nitric acid was found to contain albumen. "In all these experiments the kidneys operated on were more or less congested; their colour darker, and their bulk and weight greater than the remaining organs, which were in every instance perfectly healthy in

colour, size, and structure." (*London Med. Gaz.*, April, 1842.) Mr. Robinson refers, in confirmation of his own view, to three cases described by Dr. Stokes in the Dublin Journal for March, 1842, in two of which there was inflammation of the emulgent veins, and in all three thickening of the coats and obstruction to the flow of blood; and in all albuminous urine had been secreted during life.

Dr. Reginald Burbridge, physician to the Taunton and Somerset Hospital, in a communication in the Medical Gazette for the month just quoted, refers to Drs. Elliotson and Darwall, as having long ago pointed out the fact that albuminuria, the presence of albumen in the urine from disturbed function, results from a congestion of the renal capillaries, and is supposed to be proportioned to the extent of it. Dr. Burbridge himself, some years ago, maintained, in his inaugural essay (at Edinburgh), the congestive origin of the disease. He points out the "one common secondary cause — a protracted disturbance in the vicarious action of the kidneys." Reference is made by this writer to the researches of Drs. Abercrombie and Alison, which have sufficiently proved that, in persons of irregular, dissipated habits, and broken constitutions, when the blood is unusually serous and its motion languid, there is a marked tendency to minute albuminary deposits, taking more or less of the tubercular form; and this is much promoted by unusual congestion of blood affecting any organ.

Dr. Burbridge has been often struck by the close resemblance which certain of these kidneys, altered by granular disease, seem to bear, in their intermediate or transition state, to the appearance of the gin-liver, or nutmeg-liver of some authors; an aspect which Mr. Kiernan has proved to arise from mere congestion of blood, and which Mr. Robinson produced in the kidney by tying the renal vein.

The morbid changes in other organs may be readily inferred from what you have learned of the secondary disorders of granular kidney. The supra-renal glands are often tuberculated and granular. Dropsical effusions are seen in the cellular tissue, lungs, peritoneum, pleura, and more rarely in the pericardium. Emphyema and œdema of the lungs; tuberculated and enlarged liver; softened spleen; hypertrophied and dilated heart, on one or both sides, are also among the morbid alterations; some appearing in one, some in another subject. The mucous coat of the intestines often presents redness, effusion of lymph, enlarged muciparous glands, and ulceration. Among the rarer appearances are, œdema of the glottis, ulceration of the larynx, redness of the mucous membrane of the stomach or bladder, induration of the spleen.

Causes.—It is not easy to assign a common cause, or, in a particular case, the specific cause of Bright's disease. As in many other organic degenerations with functional disturbance, the operation of causes is often of long duration, and constitutes a state of predisposition, on which any ordinary exciting cause ingrafts the open disease. It is well remarked by Dr. Bright, that there is great reason to suppose that the seeds of this disease are often sown at an early period; and that intervals of apparent health produce a false secu-

rity in the patient, his friends, and his medical attendants, even when apprehension has been early excited. Intemperance is the most usual predisposing cause, that which deteriorates the blood, overtasks for a long time the kidney in their functional exercise, and prevents their organic actions. Exposure to cold, or cold and moisture, is the most common exciting cause, or, at any rate, that which developes and aggravates the disease. Warning and monition are conveyed very impressively in the following language of Dr. Bright: "Where intemperance has laid the foundation, the mischief will generally be so deeply rooted before the discovery is made, that, even could we remove the exciting cause, little could be hoped from remedies; but, at the same time, a more impressive warning against the intemperate use of ardent spirits cannot be derived from any other form of disease with which we are acquainted; since, most assuredly, by no other do so many individuals fall victims to this vice." Constitutional circumstances are stated by Dr. Christison to clearly predispose to it. These are the constitution of intemperance, the scrofulous habit, and that state of the system which succeeds to scarlatina. Suppressed perspiration was a most conspicuous cause in Dr. Osborne's cases (*op. cit.*). On his reviewing the causes of the disease (dropsy with albuminous urine), in thirty-six cases, it could be directly referred to suppressed perspiration in twenty-two of these. Habitual use of articles of heavy digestion, such as cheese, pastry, smoked meat, &c., may so irritate the kidneys in persons predisposed to the disease as to bring it on. The constitutional, by which he seems to understand the sialogogue action of mercury, is represented by Dr. Christison to be an occasional cause. Diuretic medicines taken to excess, have appeared to Dr. Osborne to bring on the disease.

Age, sex, and profession, have an indirect influence only. In 74 fatal cases, Dr. Bright found 19 under thirty years of age, 50 under the fiftieth year, 13 above fifty, and 4 above sixty. The early and the latter periods of life are comparatively exempt from the disease. As respects sex, it has been asserted that the proportion of men to women affected is as 3 to 1.

LECTURE LIII.

DR. BELL.

TREATMENT OF BRIGHT'S DISEASE, OR RENAL DROPSY.—Origin of dropsies—Antiphlogistic remedies—Appearance of the blood—After venesection, free purging—Mercurials not inadmissible in all cases—Salivation to be especially avoided—Diaphoretics of great value, and, also, all the aids for securing their effects—Warm bath—Diuretics to be sparingly used—Complication of renal dropsy with bronchitis—Treatment of—Other secondary disorders to be relieved—Employment of tartar emetic—Dr. Osborne's practice in ascites—Measures useful in the more advanced stages of renal dropsy—Alteratives—Great importance of equable temperature of the skin and of regular diet.

Treatment. — With the prevalent opinions at this time of the origin of dropsy, in visceral engorgement and chronic inflammation, or in

membranous irritation and phlogosis, and the condition of the circulation induced in consequence, the appearance of anasarca would prompt the physician, especially the American one, who derives his impressions from the teaching of Rush and his successors, to a correct treatment in the incipient stage of granular disease of the kidney. In this early or acute stage, recourse is had without hesitation to free bloodletting, as we would have in acute nephritis; and its repetition will be governed by the same circumstances as in the treatment of this latter complaint. Nor must we withhold the lancet even after the disease has lasted for some time and has assumed a chronic character, particularly if there be symptoms of oppressed lungs or hypertrophy of the heart. Bloodletting will sometimes give more relief than all our other best devised remedies; and what is also to the point, it will greatly favour the beneficial operation of these. The blood, it has been said, is buffy in a remarkable degree in this disease; and hence we must not rely on this appearance alone as a test of the propriety of fresh bloodletting, so much as on the relief of the renal distress and disorder, and a diminution of the quantity of albumen in the urine. Cupping or leeching over the loins is a useful succedaneum, and in some subjects, of excessively broken down constitutions, a substitute for venesection. A proper caution is enjoined by Dr. Christison, against pushing sanguineous evacuations too far, in the impoverished state of the blood which is so common in this disease, and a rule to guide us on this point. We are required to examine the blood analytically, and to ascertain the proportion of its colouring globules. By the latter we can measure, in degree at least, the advancement of the structural changes in the kidneys; and either press a continuance of or withhold sanguineous depletion.

After bloodletting, purgatives stand foremost in this kidney disease. Amongst these, preference is given by Dr. Bright to elaterium and jalap with bi-tartrate of potassa. Dr. Osborne restricts himself to senna mixture, castor oil, or rhubarb and magnesia. He refrained from all purgatives which also act often as diuretics. Mercury is not thought well of by Dr. Bright, except in combination with opium and antimony, in the very early stages of the acute renal disease. Dr. Osborne administered large doses of calomel when affections of the head came on; and although he admits their use in rescuing the patient from a state of approaching coma, yet, he adds, they were not followed by any benefit to the secretions of the skin or of the kidneys. In this restricted view of the operation and effects of calomel, I cannot join. As a purgative, either alone, and followed by castor oil, or rhubarb and magnesia, or combined with jalap or rhubarb, it is entitled to a preference over most of the class. In the first of these fashions it is particularly useful where diarrhœa is present, a complication contraindicating resinous or irritating purgatives. In smaller dose, as of one to two grains, or an equivalent proportion of blue mass, I know of no medicine, next to antimony, which acts generally so well on the skin by

rendering it soft and moist; certainly, none which acts so kindly on an inflamed or irritated kidney. One of the peculiar advantages of these mercurial preparations is their ready and tranquillising operation on inflamed secretory glands and surfaces. My own experience makes me as confident of the propriety of administering calomel or blue mass after venesection for an excited kidney, whose secretory function is impeded, as I would be of its use in a similar condition of the liver. I know well, indeed, that we cannot so easily insure a continuance of its salutary action, either on the skin or kidneys; but this need not deter from its use in the early stage of the disease, to which it is more especially applicable. In dropsy with hypertrophy or disease of the valves of the heart, Dr. Osborne, in unison with most practitioners of experience, thinks highly of calomel in combination with squill and digitalis, as a diuretic. Must it not act kindly on the kidneys in these cases? I have found it equally efficacious in the granular disease of the kidney; and where bronchitis is associated in the latter, I know of no adequate substitute for the calomel.

In administering mercurial preparations as purgatives, and sedative diuretics or diaphoretics, we must continually bear in mind their more than usual tendency to salivate in the cases of Bright's disease; and the injurious effects of such an operation. Certain constitutional states, such as of anæmia or chlorosis, or scrofula, will induce still farther caution, respecting recourse to mercury.

After bloodletting and purging, mild and sustained diaphoresis is entitled to especial favour. Nor must we wait for the effects of the former, before we have our patient put to bed, and his skin brought into a state of moderate excitement by external warmth; and if the extremities be cold, by warm pediluvia, and the customary adjuncts for quickening the circulation of the lower extremities. Amidst many discouraging circumstances in our prognosis of this disease, it is pleasant for us to know, as Dr. Bright assures us, that the most recent cases are often capable of cure by depletion, either by bleeding or purging, according to the acuteness of the attack, or by promoting gentle diaphoresis, both by internal remedies and by strict confinement to bed. It has happened frequently, within Dr. Osborne's experience, that by external heat alone, an improvement, both in the quantity and quality of the urine, and a material subsidence of the œdema, have taken place; and he even goes so far as to assert that, "*whenever general perspiration came on, either spontaneously or in consequence of medicine, then the cases always terminated favourably.*" The diaphoretic remedies are antimonial powders, Dover's powder, *liquor ammoniæ acetatis*; and if more stimulating preparations are required, the ammoniated tincture of guaiacum, to which sulphur may be advantageously added; or carbonate of ammonia with camphorated mixture — four grains of the former to an ounce of the latter every two hours. In aid of these remedies, and itself an agent of no small activity in the disease before us, is the warm bath, of a tempera-

ture of 96° F., in which the patient should be immersed for half an hour at a time, twice in the day, until free perspiration is brought on.

No little difference of opinion prevails respecting the advantages and even propriety of prescribing diuretics in granular disease of the kidney. Where hypothesis may be enlisted on either side, we are fain to look to experience for settling the question; but even here the contrariety of practice is great. Diuretics, entirely proscribed by Osborne, are regarded by Christison as valuable and almost indispensable remedies. Bright, whilst objecting to their use in general, gives a qualified assent to the use of them, and particularly of digitalis on certain conditions; and Rayer reports cases in which they have been the chief means of cure. By conforming to the rules which ought to govern us in the employment of diuretics generally, we shall probably find less difficulty in determining the propriety of their use in the present disease. Before bloodletting, and in the acute stage, they can hardly fail to excite the kidney and aggravate the complaint. At a later period, when phlogosis is abated, certain diuretics, such as the tincture of digitalis and wine of colchicum-seeds, with a solution of the tartrate of potassa, will exert a good effect, more, perhaps, by their sedative and cooling operation on the system at large, than by any special action on the kidneys. After all, the objections against diuretics are overrated; as both jalap and rhubarb, which are so warmly recommended for their purgative powers, are decided stimulants to the kidney at the same time. Tissot tells us, that the favourite diuretics of Rayer are acetate of potassa, and more especially a decoction of the root of the wild horse-radish; which last he prescribes in the proportion of from two drachms to an ounce and a half, in a pint of water. Two cures are reported from using this remedy, in subjects who had not derived relief from any other means. Upon the whole, however, diuretics are entitled to be ranked on a secondary line after diaphoretics. The dose of digitalis when it is employed, as a diuretic, is from one to two grains in powder, or ten to fifteen drops of the tincture three times a day; and of the bi-tartrate of potassa, a drachm or two drachms as frequently, in large dilution.

In renal dropsy, complicated with bronchitis, Dr. Osborne has derived much benefit from balsam copaiba in camphor mixture and cinnamon water with gum arabic. He directs ʒi. in four ounces of the mixture, of which an ounce is to be taken three times a day. In dry bronchitis the following mixture caused free expectoration: —

℞. Gum ammon.,
Gum arabic.,
Sacch. alb., singul. dr. ij.;
Balsam copaib. dr. ss.
Aqua cinnamomi, oz. iv.

A tea-spoonful to be taken every hour and a half. In some instances, in which the copaiba produced nausea, it was superseded by

the tincture of cubebs. Copious expectoration, on the other hand, which oppresses by its quantity without affording relief from the disease, is abated by the administration, in conjunction with the diaphoretic course, of sub-acetate of lead, one grain, and watery extract of opium, a quarter of a grain, four times daily. The application of leeches externally to the larynx, is truly represented by Dr. Osborne to be a most important part of the treatment of bronchitis. The good effects of it are not confined to the larynx, but are apparent also in the unloading of the mucous membrane of the bronchial tubes through their entire extent. In addition, blisters should be applied to the upper part of the sternum and under the axilla. To these Dr. O. generally adds frictions to the back and sides of the chest.

When disorder of the stomach or bowels occur, they are met by nearly the same treatment as when they are of primary occurrence. A tendency to dysentery, which is one of the most frequent forms of this complication, was obviated most speedily, in Dr. Osborne's practice, by an enema of four grains of nitrate of silver, followed in three hours after by the starch enema with tincture of opium. The first is retained only a few minutes, but the last generally remains several hours, and the irritation is then at an end.

When pericarditis was present, the internal use of tartar emetic, in addition to topical and general bloodletting, produced a great increase of urine with amendment of all the symptoms; while a decrease occurred on two several occasions in which it was for a time superseded by squills.

Dr. Barlow ranks tartar emetic among our chief remedies in the acute form of dropsy with renal disease, whether it follow scarlatina in children, or come on without any such precursor, or adults (*Guy's Hospital Reports*, April, 1840). He regards it as eminently calculated to equalise the circulation, subdue the inflammatory action, and restore the functions of the skin. By "its local effects upon the capillaries, when it reaches them through the circulation," it diminishes the inflammation in the superficial capillaries of the lining membrane of the *tubuli uriniferi*. As regards the dose, it may be given, in the first instance, where the pulse is hard and full, in such quantity as to produce nausea; but in low states of the system he prefers small doses frequently repeated, "so as to reach the capillaries without producing depression." He has never found it necessary to give more than half a grain at once to an adult. Doctor Barlow does not recommend the use of the antimony in this disease to the exclusion of other means calculated to aid in fulfilling the same indications; and among the most valuable of these adjuncts should be reckoned moderate local depletion, hydragogue cathartics, the warm bath, or, what is perhaps of equal value when this cannot be procured, the investing of the loins in a large linseed-meal poultice.

If I continue the outline of treatment adapted to the chief complications of disease of other organs with that of the kidneys, it is under a belief that you cannot be as well familiarised in any other way

with the various symptoms and modifications of one of the most common, and, at the same time, dangerous forms of dropsy. Hence, what I now say on these points, as indeed nearly all that I have said in this lecture on Bright's disease, is a contribution of the most valuable kind to the *pathology and treatment* of dropsy, and is so much in anticipation of any future observations *en professo* on the subject. Dropsy is, in fact, but a symptom, and hence ought to be discussed under the heads of the organic lesions in which it is manifested. Moved by these considerations, I shall introduce some further particulars of renal dropsy as set forth by Dr. Osborne, whose clinical opportunities have been considerable.

"In valvular disease of the heart, and, especially, imperfect closure of the aortic valves, the patient, in addition to the diaphoretic treatment, took a mixture of a small quantity of tincture of digitalis, with carbonate of ammonia, camphor, and Hoffman's liquor. This combination was intended to act as a sedative to the heart, and, at the same time, as a stimulant to the circulation through the capillaries. Whether it acted in this way or not, may be questioned; but it was certainly followed by warmth of the extremities, diminution of the violent action of the heart, a sense of general relief, and a capability of sleeping with comfort at night.

"The measure, however, which appears to me of the highest importance in diseased aortic valves, is the establishment of a large issue over the region of the heart. On some future occasion I shall bring forward some faithfully reported cases, which prove that organic disease of the valves is capable of great amendment, if not of complete cure, by this and other counter-irritants, aided by the administration of suitable internal remedies.

"General œdema, with coagulable urine, and obstructed perspiration, is not unfrequently accompanied by effusion of serum into the peritoneal cavity. This, when not considerable, or of long standing, disappears along with the general swellings. When, however, ascites has formed either in consequence of chronic peritonitis, or induration of the liver, then, although the general swellings have been removed, we have still to deal with a refractory, and often intractable complaint. In addition to the means which are usually adopted, viz., courses of mercury and purgatives, I am enabled, from experience, to suggest some other measures, to the employment of which I must attribute the fact, that within the last four years I can recollect only one case in which tapping was performed in my hospital wards, while previously it was a frequent operation. These are the repeated application of leeches to the rectum,* so as to un-

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* "In the Dublin Medical Journal I have described a convenient mode of introducing leeches into the rectum, by securing them with silk threads attached to the grooves of an instrument prepared for the purpose."

load the vessels of the vena portæ. The applications of various stimulants to the abdomen, as 1st, an ointment composed of equal parts of iodine, mercurial, and cantharides ointments. 2dly, A paste formed of Spanish soap, spread upon linen, and sprinkled over with muriate of ammonia immediately before being applied; which, by the chemical decomposition which ensues, and the consequent gradual extrication of ammonia, produces heat and redness; 3dly, Sinapisms, suffered to remain till the pain becomes urgent. These have the advantage of healing with great rapidity. 4thly, Frictions of six or more drops of croton oil. These are, however, rather uncertain; in some individuals producing no effect, and in others followed by erysipelas, extending beyond the seat of the application. 5thly, A mixture composed of one part of tincture of digitalis, and two of aquæ muriat. calcis; a teaspoonful to be rubbed on the abdomen, morning and evening. This compound appears to excite the absorbents, and increases the discharge from the kidneys, but does not produce any sensible redness of the skin. The application of these counter-irritants and excitants of the absorbents may be continued, when the administration of mercury and of drastic purgatives has become no longer advantageous, or indeed safe. It is certain that by these latter remedies the distention of the abdomen may frequently be diminished to a certain extent; but beyond this it is extremely difficult to proceed. Whenever the peritoneum has engaged in the process of morbid secretion, and the cavity of the abdomen has remained distended a certain length of time, it obstinately perseveres in retaining a certain quantity of fluid. The urgent and continuous use of the powerful remedies now mentioned, in such cases, is then not only abortive, but sooner or later causes irritation and ulceration of the bowels; and the patient sinks in consequence. It is therefore preferable, in those refractory cases, when the swelling no longer diminishes under the employment of internal medicines, to abstain altogether from their use for a time, and to rely on the application of counter-irritants and bandages, together with regulated courses of diet, and changes of air, until the patient's vital forces are recruited, so as to enable us to make fresh efforts to dislodge the fluid.

"When noises resembling the ringing of bells in the ears, wakefulness, delirium, stupor, or headache, come on, then, if there is increased heat of the head, blood must be taken either from the temporal artery, or by means of leeches applied to the temples, or behind the ears. Calomel must be freely given, and followed by brisk purgatives. If those symptoms continue, it will be necessary to apply sinapisms to the nape of the neck, and to persevere in the use of mercurials. These symptoms, which are always of formidable import in dropsies, and peculiarly so, because usually neglected, and erroneously supposed to belong to the disease merely as symptoms, may, under this treatment, be very generally averted; and it would be acknowledged, from an examination of the fatal cases recorded in my table, that, though the patients died immediately

from the affection of the brain or its membranes, yet in most, if not all of them, peculiar circumstances existed, which had the effect of disarming the remedies now mentioned of their usual powers, and which, in those particular instances, rendered the disease necessarily mortal."

In the advanced and chronic stages of renal disease, particularly where any change may have slowly taken place in the structure of the kidneys, we must be content with a less active treatment than that which has just been detailed. We can seldom promise our patient an entire recovery under these circumstances; but with care on his part, and judicious advice on ours, we may prolong his life for years. "Most of the secondary disorders are obstinate when they concur with diseased kidneys. Dyspepsia may be much mitigated, but is apt to recur. Chronic vomiting, once fairly established, is seldom effectually checked, and may be considered an unfavourable sign. Diarrhœa is difficult to stop, and apt to return, and therefore must be viewed as unfavourable. Catarrh is often removable; but where it resists treatment, the complication is of evil import. Coma is very rarely arrested, and is one of the most unpropitious prognostics among secondary affections. Diseased liver and diseased heart are also unpropitious; being themselves incurable, besides aggravating the effect of renal disorder. The acute inflammations are generally severe, but commonly yield to remedies." (*Christison, op. cit.*)

Among the medicines of the alterative class, and in the use of which the patient must persevere for a length of time, may be mentioned the alkalies, particularly potassa, small doses of antimonials, and certain astringents, such as uva ursi, pyrola umbellata, diosma crenata (buchu); and if there be irritability of the kidney and urinary passages, conium, or still better, Dover's powder. The mineral acids are, Dr. Bright thinks, best adapted to the decline of the acute attacks, and are best given conjoined with sedatives. The prohibition of mineral acids by M. Rayer in chronic nephritis, will hardly be revoked on the present occasion. In the alkalies, Dr. Bright has been much disappointed; and they have even at times seemed to aggravate the disease. "The very careful exhibition of the vinum ferri, the tinct. ferri muriatis, or some other chalybeate preparation, has sometimes appeared to do good for a time, but has not generally been admissible for a continuance." Deserved stress is still laid on purgatives, even when the disease has become perhaps organic.

Mercury still has hold of the affections of some to that degree as to induce them to hope for benefit, if not cure, from its absorbent action, and consequent removal of the deposits which take place in the *tubuli uriniferi*, in the more advanced stages of the disease. Better founded expectations are entertained of the alterative powers of iodine, and particularly of the iodide of potassium (hydriodate of potassæ), under these circumstances.

On all the means of preserving an equable temperature of the

skin, the precautions and pains can scarcely be too great, and must never be suspended. Flannel is to be constantly worn next the skin, and the rest of the clothing, including protection for the feet, correspondingly warm. In the house, the apartments should be kept of a mild and uniform warmth, with as much care as would be deemed necessary for a consumptive patient. To the same effect is the recommendation of Dr. Bright, that a person suffering under renal disease should seek a warm climate for restoration, at any rate relief and suspension of his malady. The exercise should be gentle and sufficient, enough to moderately excite the skin without causing much sweating and the danger of subsequent chill,—and to quicken the circulation without giving rise to fatigue.

A great deal depends upon diet. Milk, when it agrees, ought to be the preferred article. Light animal food frequently agrees; pastry, fruits, and all badly cooked vegetables are injurious. Fermented and distilled liquors, and tea and coffee, should be abstained from.

LECTURE LIV.

DR. BELL.

SUPPURATION OF THE KIDNEY—Directions taken by the abscess—Most frequent cause, formation of calculi—Not incompatible with even long life.—*Pyelitis*, its varieties, its tendency to end in suppuration and in nephritis—Its *anatomical lesions.—Treatment.*—FUNCTIONAL DISEASES OF THE KIDNEYS.—Suppression of Urine.—*Ischuria* or *Anuria*,—an effect rather than a primary disease—Sudden in its attacks—Sympathetic disturbances—Coma—Pyretic ischuria.—*Anatomical lesions*, not constant—*Prognosis* is unfavourable—*Treatment*—Antiphlogistic.—*Morbid secretions*—Circumstances under which they occur.—*Excessive diuresis* or *hydruria*—Not always productive of disease—Most troublesome in old persons.—*Treatment*, dietetic and medicinal—*Diabetes insipidus*, or *anazoturia*,—*Symptoms—Treatment*—Diabetes insipidus with *azoturia.—Diabetes mellitus*, or *melituria*—Its definition,—qualities of the urine, symptoms, terminations, causes, *post mortem* appearances—*Treatment*—Diet and regimen of most importance—Various other diatheses of renal secretion, with albumen, lithic acid, or *lithuria*,—earthy and earthy alkaline phosphates, or *ceramuria*, cystic oxide, oxalic acid or *oxaluria*, lactic acid.—Hæmaturia.—DISEASES OF THE BLADDER—*Cystitis*, its varieties—The most important is inflammation of mucous coat, or *catarrhus vesicæ—Symptoms and treatment.*

HITHERTO I have spoken of obvious and admitted organic lesions of the kidneys, as giving rise to and measured by functional disorders, either of these organs themselves or of other organs. In next directing your attention to a number of other renal diseases, which depend on, or rather are chiefly manifested by functional disturbances of the kidneys, I would not be understood to deny the presence of accompanying lesions of structure; but merely to tell you that the connection between the two series of phenomena,—functional disturbances and structural changes,—is not so manifest,

nor are they in number and distinctness so proportionate to each other as in the diseases which I have already described. But, before attempting this part of my task, I must say a few words on the termination of renal inflammation by suppuration. Were the pus discharged with the urine, the product of phlogosis of the body of the kidney alone, it ought to have engaged our notice under the head of acute nephritis; one, but happily not usual, termination of which is by suppuration. But, in the first place, I have adduced reasons for believing that pus may be discharged from the kidneys without any affection of their parenchymatous and secreting structure, — the disease being confined to the pelves and calyces; and, in the second place, pus may be secreted from the kidneys and found in the urine, without any special lesion of the urinary apparatus. Hence, the appearance of pus in the urine is not necessarily diagnostic of disease of any part of the renal organs, nor of the bladder or urethra; although it ought properly to give rise to what in a court of justice would be called violent suspicion of such an occurrence. Some curious but at the same time well authenticated cases of purulent, or purulent looking deposits in the urine, in diseases other than renal, and in cases of abscesses in other and remote parts, are given by Dr. Willis in his valuable work already recited; and to which, I am glad to add, you can have ready access, as I have had an American edition of it published in my *Select Medical Library*. Burdach regards pus as a secretion intermediate between hemorrhage and secretion; an opinion corroborated by Mr. Gulliver, who has discovered globules of pus in the blood; not merely in every case in which pus was actually formed in some particular part, but in which there was inflammation and the phenomena precursory to its formation. But although in the blood, pus is foreign to it, and must be discharged. This is sometimes done, at random as it were, in the viscera, cavities of the joints, &c.; and in a more favourable manner by the channel of the kidneys. Professor Chelus of Heidelberg observed the urine of a patient labouring under a purulent deposit within the pleura, from a penetrating wound of the chest, to deposit pus which could not be distinguished from that which flowed out of the chest by the wound.

When acute nephritis is about to end in suppuration, we see the customary, but in the present case not distinctly morbid signs of rigor and hectic fever; and sometimes, if the enlargement of the kidney has been considerable, a prominence and fluctuation noticed externally. But this last is more common in that variety of the disease which M. Rayer calls *peri-nephritis*, — agreeably to his division, with which, in a former lecture, I made you acquainted. This eminent pathologist believes pus to be a frequent termination of the simple variety, as contrasted with the arthritic one, of nephritis. If it be so, we must receive it in the same light in which Burdach speaks of its occasional occurrence, viz., a modified secretion; a termination and means of relief of inflammation

of the secreting portion of the kidneys. At other times, a distinctly formed renal abscess may burst suddenly into the cavity of the kidney, and large quantities of pus, occasionally mixed with blood, and also with gravel, if the inflammation have been caused by renal calculi, appear in the urine. It should be mentioned, however, in this place, that the most frequent cause of suppuration and abscess of the kidney is inflammation from calculi. Suppuration sometimes leads to fistulous passages and openings, as in the lumbar muscles, pointing outwardly; or communicating with the liver and giving rise to hepatic abscess; or with the peritoneum, causing acute peritonitis; or with the colon or duodenum, through which the contents of the renal abscess are discharged by the rectum.

Life may be protracted for a long time under the existence of considerable disorganization of a kidney, as in the instance mentioned by Dr. Prout, (*op. cit.*, p. 169,) of a gentleman who, before the age of twenty, laboured under distinct symptoms of an abscess in the kidney; but who, notwithstanding, lived to the age of seventy; and who almost daily, throughout that long period, passed more or less of purulent matter in the urine. "His appearance and state of health were never robust; yet he enjoyed tolerable health and comfort; and only felt greater annoyance than usual when the purulent matter, as it would occasionally do, almost disappeared from the urine. On such occasions the stomach became deranged; and he had an attack of feverish excitement, which usually terminated after a short time, in the sudden discharge of an enormous quantity of pus with the urine; after which he speedily recovered his former state of health. Such attacks were usually brought on by exposure to cold, or by inattention to the state of the bowels, diet, &c., and he finally sank under an unusually severe attack of this kind." Dr. Prout adds in a note: it is remarkable that dropsy rarely appears under this form of disease; the gentleman alluded to, in the text, even to the last, never suffered from œdema. But the phenomena connected with the formation of pus have been placed in a much clearer light by M. Rayer, who shows that this product is by far more common in his second division of renal inflammation, or in pyelitis, than in nephritis proper. A few words now on this disease.

Pyelitis, already defined to be inflammation of the pelves and calyces, may be, as was also stated at the time, simple, blennorrhagic, calculous, or verminous; varieties, the three last of which express very well its occasional origin. Pyelitis is, also, acute and chronic. The symptoms are nearly the same with those of nephritis; the pain is represented to extend more frequently to the testicle, and to be accompanied by retraction of this organ, than in inflammation of the substance of the kidney. It has great tendency to terminate in suppuration; and hence in the properties of the urine we find the best diagnostic symptoms of pyelitis. A frequent termination, ought we not rather to say extension and complication also, is nephritis. The accumulation of matter is sometimes so great

as to distend the pelvis and calyces, and at length the kidney is stretched out, in a measure, and at the same time loses its healthy organization by atrophy; and, occasionally, an enormous pouch is formed which points and discharges in a manner similar to that just now described, when speaking of abscess of the substance of the kidney. We can readily believe and understand the fact, that pyelitis seldom exists without being complicated with nephritis; and considering its common origin from the diseases of the lower part of the urinary apparatus and retained calculi, that it should precede this latter in point of time. A frequent complication, and, it may be added, origin of pyelitis, is inflammation of the mucous membrane, or catarrh of the bladder.

The *anatomical lesions* in *acute* pyelitis are, vascularity of the mucous membrane of the pelvis and calyces, with red spots and ecchymoses, and occasional extravasation of blood upon its inner surface, and sometimes lymph thrown out in patches so as to obstruct, the ureter. Dilatation of the pelvis, where retention of urine was the exciting cause, is frequently met with; and occasionally we find softening ulceration, or even perforation of the membrane, where calculus was the cause of the disease. The urine contained in the pelves and calyces commonly contains blood and pus, not always discoverable by the naked eye, but visible enough with the help of the microscope. It also contains amorphous sediments of lithate of ammonia, crystallised lithic acid, crystalline phosphate of magnesia and ammonia, and likewise albumen.

In chronic pyelitis, the membrane is dull white, its vessels large and varicose, but not reticulated; the external veins on the kidney are large; the pelvis and calyces are distended in many cases, and then the membrane is thickened, without visible vessels, and the ureter much contracted, and sometimes reduced to a mere fibrous cord. Sometimes the inner surface of the membrane is of a reddish-brown tint or mottled; at other times it exhibits transparent vesicles like sudamina; and occasionally ulcerations are seen: these last corresponding with the pressure made by the edges and points of calculi.

The treatment of pyelitis will not differ from that of nephritis; with the addition of those measures obviously called for on a removal of the exciting causes, such as of calculi, if possible, and at any rate of phlogosis of the bladder or urethra, as in cystitis and suppressed or aggravated gonorrhœa. A fact, connected both with diagnosis and treatment, is the change which pus undergoes by the action of ammonia and other alkalies, should be known. The ropy and slimy matter resembling mucus detected in the urine, in pyelitis as well as in chronic cystitis, is pus thus modified, either by the ammonia originally in the urine, or by alkaline remedies administered for the disease.

Functional Diseases.—I shall now take up that other division of renal diseases, of a more strictly functional nature, at least in the sense explained in the beginning of this lecture, in which the chief morbid manifestations, as far as the kidneys alone are concerned,

consist in some notable change in their secretion, either as regards the deficiency or the excess in quantity, and other great varieties in the properties of the urine. But I can hardly, at this time, promise to give you more than a syllabus of this part of our subject, which, as it presents less novelty, and at the same time is more fully treated of in many works of ready reference, will leave a less sensible deficiency than you might otherwise experience.

Suppression of Urine — Ischuria renalis of most writers, — the *Anuria* of Dr. Willis. You must distinguish suppression of urine, that is, a stoppage of the secretion, from retention of urine, or a stoppage of its excretion, — as where it accumulates in the bladder and cannot be discharged. Whether ischuria occurs from organic disease of the kidneys or is symptomatic of other diseases, as of fevers, cerebral affections, &c., it is always serious, and often fatal. Properly considered, it is a symptom more than a disease; since it can hardly be said to acknowledge any one anatomical or physiological cause, either primary or secondary. Diminution in the quantity of urine is quite common in nearly all acute febrile and inflammatory diseases. Ischuria is most met with in infants and in old persons. In degree short of this, a disorder manifested by secretion of a very small quantity, which is excreted with great pain and sense of burning, is seen in these persons. They also suffer at the same time from cutaneous eruptions and sores wherever two surfaces come in contact, as at the axilla, folds of the neck, &c.

Complete ischuria, or anuria, makes its attacks generally in the midst of perfect health; sometimes in gouty subjects, it represents or supplies a paroxysm of the disease. The most notable symptoms, after those of general uneasiness and anxiety, are nausea followed by vomiting, which continues to be one of the chief, as it is one of the most troublesome symptoms through the whole course of the disease. There is at the same time a singular torpor, both of mind and body. The pulse in general is not much accelerated; sometimes it is slower and feebler than natural; the patient scarcely complains, and gradually lapses into a state of drowsiness and incoherent rambling; the drowsiness increases, and at length terminates in complete coma; in which state, sometimes after repeated attacks of convulsions, the patient expires. It is only after minute inquiry that the practitioner called in to the case ascertains that some time has elapsed since the patient made water. Examination of the pubic region shows no fulness nor pain: a request that he should make water is so far complied with that he passes, after some delay, a spoonful or two; probably he cannot pass a drop. To give the requisite certainty on the subject, a catheter is now introduced into the bladder, and half an ounce or only a few drops of urine is discharged.

In the generality of cases coma occurs about the fourth or fifth day from the time when the secretion of urine is totally suspended; and death usually takes place after the lapse of a few days more. Every now and then, young women subject to hysteria take a fancy to impose upon their medical attendants, by simulating ischuria

renalis. Mr. Laycock, in his treatise on the *Nervous Diseases of Females*, (Philadelphia Edition,) relates some curious instances of this kind. We read and hear much of vicarious discharges of urine by other organs; some of the accounts of which are well authenticated, but most of them are greatly exaggerated, if not positively untrue. The subjects of most of these cases are hysterical women too, or *malingerers* in the army or navy, or loiterers about hospitals.

Anuria (ischuria) in children, is chiefly of a febrile nature; and, as Dr. Willis justly observes, is connected with derangement of the alimentary canal and nervous centres.

The *anatomical lesions* in those who have died of anuria are, some appearance of inflammation of the kidneys, especially after the disease has followed poisoning; sometimes their substance is much drier than natural. In some cases one kidney has been observed to be much enlarged, and the other reduced in size, and of cartilaginous hardness, or very vascular; or these organs are darker, flabbier, more brittle and congested than in health. The bladder is empty and contracted: the blood impregnated with urea. The organic disease of the kidneys most frequently found in connection with ischuria is granular degeneration of the organ.

Before undertaking the *treatment* of ischuria, our *prognosis* should be announced as unfavourable, since in most cases it is a fatal disease. When the urine is merely much diminished, diuretics, among which digitalis and bitartrate of potassa are preferred by Dr. Christison, will sometimes restore the natural quantity of urine for a time. But when this fluid is reduced to a few drachms in the twenty-four hours, or is altogether suspended, recovery is exceedingly rare. This opinion admits of exceptions, in the case of young and apparently well constituted and otherwise healthy persons. In such, as I have found, cupping on the loins and the free drinking of a sweetened solution of the bicarbonate of soda restores the discharge. Active purging with salts and senna, or a large dose of calomel, has had the same effect. In cases of sudden occurrence without apparently previous organic disease, full bloodletting, and anodynes combined with diaphoretics, purgative and terebinthinate injections, and the warm bath, are worthy of some confidence. The recommendation of blisters to the loins and diuretics is of less questionable propriety; but as a means of unloading the congested kidney, they are worthy of trial, after suitable venesection. To these we may add, if the disease should still persist, but in a somewhat mitigated shape, digitalis and colchicum, with blue pill, and the free use of diluents.

Morbid secretions of the kidneys, on which I am now to offer a few brief remarks, are represented by the urine. Its various states under such circumstances are thus described by M. Andral: —

1. There are cases in which there is a simple change in the proportion of the principles which enter into the composition of healthy urine.

2. Other cases, in which the urine contains new principles, as regards it, but which are found in the blood, either in a state of health or disease.

3. There are other cases, again, in which we discover in the urine new principles which are not met with in the blood.

Thus, the quantity of water, of urea, and of lithic acid in the urine may be diminished or augmented. We may find, in this fluid, albumen, fibrin, the colouring matter of the blood, or of the bile; also oxalic and hydrocyanic acids, oxides, a black or blue colouring matter, a saccharine matter, a butyraceous or fatty matter, and even hair.

The cause of these alterations in urinary composition are to be sought for in the kidneys; sometimes in parts remote from them, in morbid states of innervation, of hematosis, or assimilation, or in external causes, as in the properties of the atmosphere, food, drinks, &c. The alkaline state of the urine has been demonstrated in certain subjects suffering under typhoid fever; while, in other circumstances of frequent occurrence, this fluid is acid to such a degree as to render its emission exceedingly painful. At other times again, the lithic acid concretes, and is deposited in the form of gravel or of calculi.

Excessive Diuresis. — Both to morbidly increased quantity of urine as well as to an alteration in its quality in composition, by the addition of sugar, the name of diabetes has been given. The first is called *diabetes insipidus*, the second *diabetes mellitus*. But opsite functional states of the kidney are in this way inopportunely included under the same head; for, what analogy can there be in a simple increased secretion of urine, even in enormous quantities, which may be perfectly consistent with health, to that peculiarly morbid and so often incurable secretion, in which sugar is formed and prevails to such an extent in the urine. These different states are very properly separated by Dr. Willis, who describes under the title of *hydruria* simply excessive diuresis or discharge of urine, which is characterised by deficiency of solid matters generally. This writer introduces an account of some remarkable cases of hydruria; the subject of one of which, a Parisian artisan, aged fifty-five, in tolerable health, and of the ordinary strength of persons of his age and small stature, had from the age of five years a constant thirst upon him, and had been affected with diuresis commensurate with his thirst. From the age of sixteen he had not drank less, on an average, than two bucketfuls of water every day, often swallowing upwards of two quarts at a draught. His evacuations daily were about thirty-four pounds of urine, and at the most one pound of feces. The urine scarcely exceeded pure water in specific gravity: it had no saccharine matter in its composition, and was quite healthy. A woman, aged 40, and the mother of many children, had suffered from continual thirst and the discharge of a profusion of fetid urine since her childhood. She was in the habit, when a servant, before her marriage, to drink two or three pailfuls of water daily. This woman enjoyed very good general health.

The diuresis of old persons comes under the present head; there is not merely a frequent call to empty the bladder, but, likewise, an augmented flow of urine, often compatible with health, until the

calls are so frequent in the night as to prevent regular sleep, and thus disturb the nervous system. Generally, however, there is associated some organic disease, either of the kidney or neck of the bladder, or both. As respects *causes*, Dr. Willis admits the difficulty of telling on what peculiar morbid condition of the system generally, or of the kidney particularly, the elaboration of a large quantity of watery urine depends. It is found to be intimately connected with the nervous temperament.

The *treatment* of hydruria is mixed, or dietetical and medicinal. A nice adjustment should be made of the quantity of food and of the fluid drank, to the necessary wants of the economy. The kidneys are to be relieved, also, by an active state of the cutaneous circulation and secretion, maintained by suitably warm clothing, frictions, moderately active exercise, and the warm bath. Opium is found to diminish very considerably the activity and amount of renal secretion; and in the disease now under consideration, it may be beneficially had recourse to. I have found it most useful combined with carbonated magnesia, which latter medicine in small doses, ten grains to a scruple, two or three times a day, has exerted, in my own experience, no small controlling power over the disease. Vegetable astringents, and some of the mineral tonics, such as iron and sulphate of copper, may be given with similar intent. The state of digestion should be carefully watched, and the bowels regulated by aloes and blue mass, or, for more frequent use, rhubarb and magnesia.

The next variety of increased secretion of urine is that in which there is a deficiency of urea, *anazoturia* of Dr. Willis. It is the *diabetes insipidus* of some writers. The most marked examples of this state of the urine, in the nearly entire absence of urea, is seen in hysteric females during the paroxysm of their disorder, according to Dr. Prout; but Dr. Willis refers this condition to the head of hydruria. Hysteric urine has often a specific gravity scarcely exceeding that of spring water. It has sometimes a disagreeable odour when passed; and in almost all instances soon acquires a putrid smell, like that of cabbage-water; it becomes more or less opaque, and deposits crystals of the triple phosphate of magnesia and ammonia; especially in warm weather. Hysteric urine is not exclusively passed by females; but is occasionally voided by individuals of the other sex. This form of morbid urine Dr. Willis believes to occur frequently among the indifferently tended children of the poor: it is more common in the middle period of life, and occurs equally in both sexes.

The leading *symptoms* of the disease are great thirst, a dry state of the skin, and usually a constipated state of the bowels. In most cases there is an uneasy sensation referrible to the stomach, accompanied by a morbid craving for food; at other times nausea, and a perfect indifference to all solid matters, which are almost immediately ejected by vomiting. There are also more or less emaciation, depression of spirits, and great muscular debility, with all their consequences.

The *treatment* of this variety of excessive renal secretion is the same as that laid down in hydruria. No specific treatment can be indicated.

Diabetes Mellitus — Melituria. — Great has been the confusion caused by writers affixing the term diabetes to a great variety of diseases, the only common feature of which is excessive diuresis. Could we restrict it, as Dr. Prout does, to a disease in which a *saccharine state of the urine* is the characteristic symptom, the objection to this nomenclature would disappear; but as there is still a fear that a physician, who has a patient with excessive diuresis, labouring under either anazoturia or azoturia, or a deficiency or excess, respectively, of urea, will report his cases as one of diabetes, it is desirable that the nomenclature of Dr. Willis, in this particular at least, should prevail; and that the disease designated as diabetes mellitus, the only true diabetes, should be called *melituria.*

The peculiarity of melituria, and its difference from simple excessive diuresis, was first pointed out by Dr. Thomas Willis, in the reign of Charles II. (1684.) It is fortunately, in this country at least, a rare disease, and is so regarded in England; although cases every now and then occur there, both in private and hospital practice. Few practitioners could collect, as Dr. Babington of London did for his son, Dr. B. G. Babington, who was engaged in writing an essay on the subject, *twenty-three cases* of the disease at one time.

Symptoms. — A saccharine condition of the urine, tendency to emaciation and suppressed perspiration, are the leading, one might say, characteristic symptoms of melituria; but still we cannot deny that each one may be, is in fact present, in other diseases. Sugar is found in the urine of dyspeptic and gouty persons, as we learn from Prout; and as to the other two symptoms, I need not say that they are common to a great many diseases. Diabetes mellitus makes its approaches very insidiously; and the first symptom which more particularly attracts the patient's attention, is the frequent evacuation of his bladder, both day and night. If he attends to the appearance of the urine, he finds it to be pale, with a diminution of its proper colour, and somewhat turbid on cooling. Soon after, if not at this time, are associated a morbid state of the digestive function, manifested by inordinate appetite and dyspeptic symptoms; excessive thirst, dryness and hardness of the skin; loss of virility; and rapid loss of flesh and muscular strength.

"Diabetic urine (says Dr. Prout) is almost always transparent, and of a pale-straw or greenish colour. Its smell is commonly faint and peculiar; somewhat resembling sweet hay or milk; and its taste is usually saccharine in a greater or less degree. The specific gravity of diabetic urine has been stated to vary from 1020 to 1050; but I have once or twice seen the specific gravity of saccharine urine as low as 1015; and many times as high as 1055, or even higher. The quantity of urea is sometimes much diminished; though I have never met with a specimen in which this principle was entirely absent; and, in some instances, urea is said to exist in diabetic urine in greater proportion than natural. Lithic acid also is usually found in saccharine urine in greater or less quantity; and in favour-

able cases of the disease, the quantity of this acid is often very considerable. The usual saline matters existing in the urine are met with in diabetic urine in nearly the same *relative* proportions as in health; but the *absolute* quantity of saline matters, viewed in relation to the quantity of urine passed, is much diminished. Sometimes diabetic urine contains a little blood (*Watt on Diabetes*, pp. 47, 74); and not unfrequently albuminous matter, analogous to that of chyle. I have seen it also contain a white, milky-like fluid, precisely similar to chyle, which slowly subsided to the bottom of the vessel. In this case the vinous fermentative process was induced very rapidly in the urine; the chylous matter apparently acting like yeast.

TABLE.

Specific gravity compared with 1000 parts of water at 60 degrees.	Quantity of solid extract in a wine pint.	Quantity of solid extract in a wine pint, in			
	grains.	*oz.*	*dr.*	*scr.*	*grs.*
1020	382·4	0	6	1	2
1021	401·6	0	6	2	1
1022	420·8	0	7	0	0
1023	440·0	0	7	1	0
1024	459·2	0	7	1	19
1025	478·4	0	7	2	18
1026	497·6	1	0	0	17
1027	516·8	1	0	1	16
1028	536·0	1	0	2	16
1029	555·2	1	1	0	15
1030	574·4	1	1	1	14
1031	593·6	1	1	2	13
1032	612·8	1	2	0	12
1033	632·0	1	2	1	12
1034	651·2	1	2	2	11
1035	670·4	1	3	0	10
1036	689·6	1	3	1	9
1037	708·8	1	3	2	8
1038	728·0	1	4	0	8
1039	747·2	1	4	1	7
1040	766·4	1	4	2	6
1041	785·6	1	5	0	5
1042	804·8	1	5	1	4
1043	824·0	1	5	2	3
1044	843·2	1	6	0	3
1045	862·4	1	6	1	2
1046	881·6	1	6	2	1
1047	900·8	1	7	0	0
1048	920·0	1	7	1	0
1049	939·2	1	7	1	19
1050	658·4	1	7	2	18

"The preceding table, constructed by Dr. Henry, shows the quantity of solid extract in sixteen ounces of urine of different specific gravities, from 1020 to 1050. In the experiments which furnished the data of this table, the urine was evaporated by a steam heat till it ceased to lose weight: and till it left an extract which became solid on cooling. (*Annals of Philosophy*, Old Series, vol. i., p. 27.)

"This table enables us to ascertain with considerable precision the quantity of solid matter voided by a diabetic patient in a given time. Thus, suppose ten pints (old wine measure) are passed in twenty-four hours, of the average specific gravity of 1·040; it appears from the table that this quantity will contain 10×1 oz. 4dr. 2scr. 6grs.=15oz. 7dr. 2 scr.; or upwards of a pound and a quarter of solid extract."

Together with saccharine urine, another most striking and almost constant symptom is diuresis in every possible degree. Cases are on record in which thirty pints and upwards have been discharged, in twenty-four hours, for weeks, and even for months together. But still, diuresis is not a necessary part of the disease. The irritation in the stomach, mouth, and fauces, manifested so generally by a red tongue, and a sense of heat at the epigastrium, is present also in the urinary passages; and the external orifice of the urethra is often red in consequence; and there is sometimes phymosis. These symptoms are occasionally among the first that have been noticed in diabetic individuals; while in others they never appear at all. The disease is not confined to spare and feeble habits; Dr. Prout has repeatedly met with it in individuals of a fat and powerful frame.

The composition of the urine varies, independently of its saccharine ingredients, from that in health. It is denser than natural, both in the actual and relative proportion of its solid contents; being sometimes as high as 1050, or even 1055. Its quantity has been already mentioned to be excessive, far beyond, indeed, that of fluid drink. An interesting fact is related by Dr. Bardsley, which serves to show that the excess is made up by absorption of moisture from without, rather than always from the component fluids of the body. It is, that the liquid discharged may exceed the alimentary fluids, even when the patient is gaining weight. The difference, however, between the ingesta and the renal excreta is sometimes enormous. In a case in Dr. Christison's practice, it was ascertained that, for at least four days, the ingested liquids from all sources amounted to 48 ounces daily, while the urine was no less than 240 ounces. The proportion of solids, instead of being, as in health, between 30 and 68 parts in a thousand, often rises in saccharine diabetes to 90, 100, or 120; and even as high, in Dr. Christison's experience, as 136. The actual discharge of solid matter in the urine, as first noticed by Cruickshank, is far beyond what it is in health. The daily discharge of solids, in common, by the urine, seldom exceeds two ounces and a half avoirdupois, in the highest health. But in diabetes it is not uncommon to find the discharge

of solid matters so great as 22 or even 32 ounces. By the table and formula of Dr. Henry, the quantity thus excreted is easily found; and it ought to be accurately ascertained, as an aid to the study and treatment of a case of saccharine diabetes. The remark of excess of urine over the fluids drank, applies also to the disproportion between the quantity of solids ingested, and that of the excreted solids in the urine; the latter being more than the solid food taken.

Urea was thought, on the authority of Bostock and others, to be wanting in the urine, in melituria; but succeeding experimenters have shown, first, that it was actually present, in a certain proportion; then, that it was in as large a proportion as in health; and finally, by Mr. McGrigor, that it was in considerably larger proportion than in health. (*London Med. Gaz.*, vol. xx.) He found that one diabetic patient was passing 1013 grains of urea daily; a second 945 grains; a third 810 grains; and a fourth 512·5; the quantity discharged by a person in health amounting to from 362 to 428·5 grains. None of these patients had undergone any treatment, and the specific gravity of the urine in each, in succession, was 1·040, 1·045, 1·034, and 1·050; the quantity of urine discharged being, in the same order, 38½lbs., 30lbs., 40lbs., and 25lbs.

Diabetic (melituric) urine, when allowed to stand in a moderate temperature, generally becomes sour, and smells like turned milk. Sometimes it ferments briskly in the first instance. "The addition of a little yeast, especially if the urine have been previously somewhat concentrated by evaporation, always causes it to undergo the vinous fermentation, after which it yields alcohol by distillation; and this, freed from water and weighed, is one of the most certain modes of estimating the quantity of sugar contained in any given measure of the fluid. Reduced by gentle evaporation to the consistence of syrup, and suitably treated with animal charcoal, acetate of lead, &c., in the manner generally known to chemists, melituric urine affords a crop of crystals of a sweet substance, which differs in nothing from that obtained from the must of the grape, or from fecula by the action of dilute sulphuric acid. There also remains a considerable quantity of sweet uncrystallizable syrup, analogous in its nature to melasses." (*Willis.*)

The breath and person of those labouring under confirmed melituria have been observed to exhibit something of a musty, sweetish, haylike smell. As the disease makes further advances the gums frequently become affected, apparently as in scurvy, and then the breath is very offensive. The feces, in this disease, have commonly the dryness and hardness of those of the rodent and ruminating animals — sheep, goats, hares: they are without the distinctive fetor. The saliva is sweetish, and the sweat has been represented to be, as in fact the furfuraceous cuticular exfoliation of the legs is, distinctly sweet to the taste.

The progress of diabetes mellitus is slow; its most frequent *termination* is in phthisis pulmonalis. It may, also, end in fatal disease of the liver and jaundice; also apoplexy; a peculiar affec-

tion of the stomach brought on by improper food; acute gastritis induced by cold drinks, when the body was heated; and, finally, inflammatory fever excited by exposure to cold, and rapidly becoming typhoid. Occasionally it is said to terminate in incurable dropsy.

The *prognosis* in diabetes is generally unfavourable. In sixty cases treated in the Edinburgh Infirmary, during a period of twenty-one years, by Dr. Christison or his colleagues, this gentleman has not known an instance of a complete cure. Some patients did indeed gain weight considerably, and had the urine reduced to the density of 1030, and to its natural colour, odour, and urinous taste, without any sweetness; but the final result was a return of the disease and death. Seldom is it in the power of the practitioner to report such returns as those of Dr. Bardsley, junior, who states, that out of twenty-nine cases of diabetes under his care, no fewer than eight recovered entirely.

The *post mortem* appearances in subjects dead of diabetes mellitus are not distinctive enough to elucidate the organic seat or origin of the disease. The kidneys are commonly found larger than in health, more flabby, more gorged with blood, and they present more numerous and larger vessels, and enlargement of the uriniferous *tubuli*. The renal arteries and veins are, also, at times, found enlarged. Sometimes there is an extensive deposition of grayish-yellow, granular matter, invading their cortical and even also their tubular structure. In a few instances the kidneys instead of being enlarged are contracted. Pulmonary tubercles are not uncommon; sometimes they are found softened, and even extensive cavities have been observed. The stomach is sometimes red, and its inner membrane rough and thickened; but often it is quite healthy. The liver, spleen, and pancreas are usually healthy; nor do the intestines exhibit unusual appearances in the generality of cases. The inference from the autopsic examinations is merely, that the pathological origin of diabetes is functional, and not essentially an organic derangement. The disease is mainly one of morbid assimilation; but in what this consists we cannot tell. With the various speculations on the special pathology of diabetes, I shall not entertain you, but pass to a hardly more satisfactory branch of inquiry, that of the causes of the disease.

Causes. — A *predisposition* to diabetes is, in Dr. Prout's opinion, more frequently inherited than acquired. When the latter is the case, it is from a variety of causes, such as residence in a cold and damp situation, particularly if at the same time conjoined with a poor and unwholesome diet, or the too free use of sugar, &c.; also venereal excesses; the abuse of mercury; and, in short, any cause tending to derange the assimilating processes. The most frequent *exciting* causes are, according to Dr. Prout, exposure to cold; attacks of rheumatism and gout; drinking of cold fluids when heated; mental anxiety or distress; also contusions or other injuries of the back from falls, strains, &c. The writer just referred to has

seen diabetes follow cutaneous affections. It seldom accompanies these; but it generally, Dr. Prout says, in his own personal experience, always, is associated with carbuncles and malignant boils, or abscesses allied to carbuncles.

Treatment. — However they may differ about the relative value of particular remedies, physicians are generally agreed about the practice in diabetes mellitus. The treatment consists mainly in the employment of bloodletting, animal diet, opium, astringents, and the diaphoretic regimen. To be at all successful, it must be conducted on general principles; and in reference to the true light in which the disease is to be regarded, viz., as a simple saccharine condition of the urine, without any increase in its quantity; and as complicated with a preternatural flow of that secretion. Diabetes is properly regarded by Dr. Prout as nothing more nor less than a form of dyspepsia; principally consisting in a difficulty of assimilating the saccharine alimentary principle; and like all other forms of dyspepsia, whether it be an inherited or an induced affection, diabetes is liable to be much modified or aggravated by concomitant circumstances.

The first and chief point to be attended to in the treatment of this disease is *diet;* under which head are included, of course, both solid and liquid aliments. Dr. Prout does not believe that a diet exclusively animal is required: but of farinaceous matters, the high or the strong, as he terms it, such as the farina of wheat in the shape of bread, &c., seem to be most easily assimilated. The low kinds, reducible to a species of sugar, are, if we except rice, inadmissible; as is strictly every variety of saccharine principle in its *crystallisable* form. This rule excludes, therefore, at once, all fruits, whether sub-acid or sweet; as well as every compound, natural or artificial, into which sugar enters. Every infringement of this rule retards the cure or endangers a return of all the worst symptoms of diabetes. Thus, Dr. Prout has known the eating of a few saccharine pairs undo, in a few hours, all that he had been labouring for months to accomplish. Quantity is almost if not quite as important as quality. Four to five or six hours is an average period to elapse between the meals; and at the time of taking solid food, and for an hour or two afterwards, all fluids should be abstained from. Generally speaking, mutton or beef, plainly cooked, and particularly mutton-chops or beef-steaks, rarely done, should be taken twice in twenty-four hours; the other meals to consist of any simple article prepared from farinaceous matters, with milk, eggs, &c., only. Fat meats often suit the case, and are taken for some time with a certain degree of relish by the patient. To animal food exclusively, without the slightest deviation, Dr. Bardsley would confine a diabetic subject, as an indispensable condition for his cure.

On the score of drinks great reserve and selection are requisite. The quantity must be very limited. Distilled water is thought well of by Dr. Prout; and large experience is in favour of carbonated lime or magnesia waters, or lime water with milk, for the quench-

ing of the thirst. All the stronger saline waters should be carefully avoided. With very few exceptions, Dr. Prout has seen more relief from thirst and more support given by sound porter in diabetic cases, than by any other means whatever.

Of the strictly medicinal means mentioned as curative of diabetes, bloodletting is restricted to the young and more robust, and to recent cases. Preference in more advanced stages should be given to topical abstraction of blood by means of leeches applied from time to time over the epigastrium. Stress is laid by some on repeated purgation; but laxatives, to keep up a soluble state of the bowels, are, in general, preferable. As we should readily believe, *à priori*, much good is derived from the regular use of diaphoretics; not so much to cause exhausting discharges from the skin as to keep up a moderately excited state of its secreting function. In aid of this class, and as permanently beneficial agents, all the means already recommended for hydruria should be had recourse to here, for maintaining a permanently equable temperature of the skin and activity of its capillary circulation. In confirmation and illustration, at the same time, of the efficacy of cutaneous excitement, I may mention the success which has attended the employment of the vapour bath of a high temperature. Some have gone so far as to attribute the alleged exemption of the Russians from the disease to the use, by all classes, of the vapour bath.

Of the sedative remedies, opium claims the first place, and alone, or in combination, as in Dover's powder, it is certainly one of the most useful we possess. The dose of opium is a grain twice or thrice a day, gradually increased so as to keep up a gently hypnotic and soothing action. Astringents are often usefully combined with opium. Those of the mineral kind, and especially the sulphur of zinc and acetate of lead, are preferred.

Among topical applications, after leeches to the epigastrium, cups to the loins, and blisters on the same part and on the stomach, more permanent counter-irritation by means of tartar emetic ointment, and secretory derivation by issues or seton, are entitled to some confidence.

Diabetes Chylosus. — *Chylo-serous urine* of Prout is another morbid secretion from the kidneys, with certain associated functional derangements of other organs. Chylo-serous urine is distinguished by its white appearance, and by undergoing, in greater or less degree, spontaneous coagulation. Its specific gravity varies from 1·010 to 1·020 or upwards: it always contains urea, and the saline matters found in healthy urine. The disease occurs in both sexes, before and after puberty; of the thirteen cases with which Dr. Prout had cognisance, five were males and eight were females. The constitutional disorder is less than might be expected; two of the females, for instance, while labouring under the affection in a marked degree, became pregnant, and brought forth healthy children. Of the thirteen cases, seven occurred either in natives of hot climates, or in individuals who had resided many years in them. Dr. Prout thinks

this a predisposing cause. M. Rayer says that the disease occurs frequently in Brazil. The disease is not necessarily connected with organic lesion of the kidney. In one of the three fatal cases out of the thirteen that reached the knowledge of Dr. Prout, the kidney was found to be perfectly healthy. The subject of this case was a young girl, of about fifteen years of age, and the immediate cause of her death was inflammation of the bowels. In one case, in which the urine was examined twice a day, this fluid was found to be perfectly free from albuminous matter.

The urine after it has been discharged for a short time, sometimes coagulates into a gelatinous body like *blanc-manger*, and afterwards gradually separates into a clean, yellowish fluid, and a white clot; at other times, a white, flaky matter is deposited without general coagulation of the mass; and in other cases, again, a white, homogenous substance is thrown up to the surface like cream. The matter which separates in all these shapes appears to differ somewhat from albumen, to approach to fibrin or casein in its characters, and to contain some oleaginous or fatty matter, which may be easily removed by sulphuric ether (*Christison*). In a case described by Dr. Graves the coagulable matter was casein.

The *treatment* has not been well defined in this disease. The only case that I remember to have seen was that of a student of medicine, many years ago, who was a sufferer from dyspepsia to a great degree; undergoing frequent attacks of gastrodynia, and generally suffering from disordered bowels. With him this morbid state of urine was chiefly manifest during the winter, while attending medical lectures in this city. He sat up very late, and took little or no exercise, ate with good appetite and without special restriction. He found that, at any time, he could for a day or two remove or prevent the chylous appearance of the urine by even a small dose of magnesia. On his return to the country in the spring, after his first winter course of lectures, the disease left him, or recurred but a few times for a short period. The chief if not sole change in his life at this time, was in his taking a good deal of exercise both on foot and on horseback; his habits of study and diet being nearly as before. During the next winter in the city he had the disease again; but on the approach of spring it disappeared. He went abroad, and was for a time first in a warm and afterwards in a tropical climate, during which period he was exempt from the disease, nor did it ever again recur, except during one winter of close study and restricted exercise in Paris.

The chief measures required are those adapted to dyspepsia, viz., the use of plain nourishing food, a regulated state of the bowels, moderate exercise, the warm bath and regular hours; and regular habits in every particular. Magnesia alone, or magnesia and rhubarb, or some of the alkalies, are among the best immediate palliatives.

The morbid renal secretion of serous or albuminous urine has already engaged our attention to an adequate extent under the head of Bright's disease, or renal dropsy, &c.

The next diathesis connected with morbid secretion from the kidney, is that of the *lithic* or *uric acid*, and its various compounds. The acid assumes two distinct general forms in the urine, viz., that of *amorphous* and impalpable sediment; and that of *crystallised* and massive concretions. The amorphous and impalpable sediments consist in general of lithic acid in combination with ammonia. The colour, *yellow* and *red*, or *lateritious*, is caused by the yellow colouring matter in the first case, and this same matter tinged with purpurate of ammonia in the second, added to the lithate of ammonia. Urine depositing red sediment is generally more acid than common; and while the quantity is less, the specific gravity is greater. It is sometimes serous or albuminous. As regards constitutional *symptoms* and *causes*, it is observed that the yellow sediments may be called those of health, or rather those which occur in healthy persons who are slightly dyspeptic, or temporarily disordered by atmospherical changes and other circumstances. The presence of red sediments generally indicate a feverish or inflammatory state of the constitution, and most commonly are regarded as signs of chronic visceral affections, and particularly of the liver.

Crystallised sediments, or *red gravel*, consist of lithic acid nearly pure. The deposition in this way is not so much an evidence of the excess of lithic acid as of its precipitation by the evolution of other substances in the urine — a process easily imitated artificially by the addition of a few drops of any acid to healthy urine. *Amorphous lithic* concretions are generally deposited in the kidneys, and, perhaps more frequently than any other cause, give occasion to that peculiar train of symptoms constituting a nephritic attack. They are of two kinds, coloured and white. The *puriform* lithic concretions have their nucleus generally formed in the kidney, though, for the most part, the concretion descends into the bladder before it has acquired such a magnitude as to give uneasiness, either in the kidney, or during its passage down the ureter. A remarkable feature attending the formation of this variety of concretions, is the *great number* in which they are usually generated,—a circumstance which may be said to be characteristic of them. They vary in size from that of a pin's head to that of a pea or marble. The urine, in this form of concretion, approaches in its properties to the state which deposits the lithic acid gravel; that is to say, usually transparent, of a light yellow colour, distinctly acid, rather copious, and of a moderate specific gravity.

Children, especially those of dyspeptic and gouty individuals, are exceedingly liable to crystallised lithic deposits in the urine. There is less disposition to form them between the age of puberty and forty years, than at other times.

The *causes* of lithic acid sediments are of two kinds—predisposing and exciting. The first is sometimes inherited, and is sometimes manifested by a strumous and also scorbutic habit. The exciting causes are, errors in diet, exercise, and atmospheric influences. In some persons any acescent food, vegetables, or fruits, will bring on an attack. Potatoes I have seen to be a very decided cause of the

fine or sandy lithic acid deposit in a person of most abstemious habits of living. Writers enter into refined speculations repecting the kind of wines that are least hurtful in this disease. The best protection is an abstinence from all. Exercise soon after a meal, or on horseback, will bring on an attack; but, on the other hand, hardly anything can be more pernicious than bodily inactivity conjoined with a full or improper diet.

Generally speaking, except a calculus exists already formed in the kidney or bladder, the appearance of lithic acid gravel is not dangerous, as long as it is not deposited while the urine is warm.

The treatment of lithic acid deposits, whether of the pulverulent or massive kinds, consists, first and chiefly, of regimen in the large sense, including both diet and exercise, and of the use of suitable medicinal substances. I shall not repeat details here, already fully given when treating of dyspepsia, and subsequently of the morbid states of the kidneys, for the regulations of diet, in which both quality and quantity are to be rigidly considered. Milk, useful in some forms of dyspepsia, is injurious in the present case. I have seen excessive lithic acid deposits in a young man, whose diet was, at the time, exclusively bread and potatoes with milk. Of the common beverages, weak black tea is the least injurious. Coffee and chocalate should be shunned altogether. Hard waters, such as pump and well, should be avoided; those from Artesian wells, or from a great depth, containing a little carbonated alkali, and pure river water, are least objectionable.

As regards medicinal means, alkalies are long established favourites in this disease. They exert, however, as Dr. Prout remarks, and I am now merely giving you a brief outline of his views, no curative influence of a permanent kind on lithic acid deposits. To be useful they must counteract acidity at the moment of its development; and their use must be constantly and daily repeated for a long period. The best time is between two and six hours after eating. As regards dose, from ten to twenty grains of the carbonate of potash will, in almost every case, be found amply sufficient to counteract the acid residuum of the meal. Dr. Prout generally prefers potash, on account of the greater solubility of the potash lithates; but soda is more grateful to a few stomachs, while others prefer magnesia. This last article is not regarded with so much favour by Dr. Prout, as by many other writers, except in acidity of the cæcum and colon. In almost all instances he associates the potassa with a few grains of nitre. By giving alkalies with tonics, the good effects of both are often lost; but their separate use is highly beneficial. Thus, he often gives tonics, even mineral acids, before a meal, and the alkalies after a meal; and with the best effects.

Among the secretions from the kidneys of an eminently morbid nature, we rank those of phosphatic salts, and their deposition in the urine. These are the insoluble salts, — the triple phosphate of magnesia and ammonia, and the phosphate of lime. The triple phosphate is usually deposited from the urine in the form of perfectly

white, shining crystals, and constitutes what is termed *white gravel*, in contradistinction to the lithic acid crystals, which, from their colour, are termed *red gravel*. The urine depositing the triple phosphate of magnesia and ammonia is generally pale coloured, and very slightly acescent when passed. For the most part it is abundant in quantity, and of moderate or low specific gravity. Exposed to the air for a short time, it gradually becomes alkalescent at the surface, even in some instances before it is cold; and on such occasions an iridescent pellicle is usually formed on the surface, which, on examination, proves to be crystallized, and to consist of the triple phosphatic salt in question. About the same time, also, minute crystals of the salt begin to attach themselves to the sides of the vessel in which the urine has stood for a short time; and this fluid speedily becomes alkaline and putrescent.

The constitutional symptoms in well marked instances of the triple phosphate deposit, are characterised by what, for want of a better term, Dr. Prout designates nervous irritability; the manifestations of which are various, and accompanied with more or less debility; a sense of sinking and exhaustion, with fatigue and pain in the back on the slightest exertion.

In describing the *causes* of this disease, we find the delicate and feeble to be its chief subjects. All the causes depressing and enfeebling the system, whether physical or moral, will, in the predisposed, bring on a deposition of the triple phosphate in the urine. Abuse in food or medicines, particularly of saline and other diuretics and alkaline remedies, and mercury, will have the same effect.

The *phosphate of lime* is deposited in an impalpable amorphous powder, which is generally white, though occasionally is slightly tinged with the colouring matter of the urine. Often it is so abundant as to be deposited on exposing the urine to heat. The constitutional symptoms are nearly the same as those accompanying the deposition of the triple phosphate.

The phosphate of lime is not part of the renal secretion merely; "the mucous membrane lining the bladder, the cavities of the kidney, prostate, &c., often throws off immense quantities of the phosphate and carbonate of lime; and from the mucous membrane of the bladder in particular, much of the phosphate of lime usually found in urinary deposits is derived. The remainder is separated by the mucous membrane lining the cavities of the kidneys, or perhaps by the kidneys themselves."

It should be known, however, that, although the triple phosphate of magnesia and ammonia, and the phosphate of lime, are each of them formed separately, and give rise to the constitutional symptoms mentioned, yet, that in by far the greater number of cases, the earthy deposits consist of a mixture of the triple phosphate of magnesia and ammonia, and the phosphate of lime, and are by Dr. Prout described under the head of the *mixed phosphates*. In this last mentioned state of things, when proceeding from constitutional, and not connected with local causes, as disease of the bladder, the urine

is generally pale-coloured, and on the whole voided in greater quantity than natural. The constitutional disorders are of a mixed nature; deranged digestion and innervation giving rise to all the chief symptoms: the expression of the countenance is haggard, the complexion sallow. Diarrhœa alternating with constipation, and black, or, what is more common, clay-coloured and yeasty dejections, are also met with.

As an excess of the mixed phosphates in the urine is seldom of common occurrence, the appearance of these salts in any quantity must be regarded as much more frequently signs of and accompanied by local diseases of the urinary organs. Hence, a deposition of the phosphates usually accompanies protracted bladder and prostate affections; and thus superadds, too frequently, the miseries of stone to the other sufferings of the patient.

The causes of a predisposing nature of the formation of the mixed phosphates, are the same as of the separate salts; viz., the triple phosphate, and the phosphate of lime. Injuries of the back, by concussions, blows, or other accidents, are exceedingly liable to bring on depositions of the phosphates in the urine; particularly if there have been predisposition in the sufferer to this state of disease. Among the general exciting causes may also be mentioned severe and protracted debilitating passions, excessive fatigue, &c., but the most frequent causes are local irritations affecting for a considerable time the bladder and urethra; as, for instance, any foreign substance introduced into the bladder, — all sorts of calculi, the retention of a catheter or bougie in the urethra, strictures of the urethra.

Of the diseases connected with *the soluble incidental matters, including soda, potassa, and ammonia*, I have not now time to speak, and must therefore refer you to the valuable work of Dr. Prout for the details of these subjects.

After a correct diagnosis of the disease connected with the deposition of the mixed phosphates, which is reached chiefly by chemical tests, we proceed to the treatment, which, as in all the diseases of the urinary apparatus, even still more than in most other diseases, consists of the dietetical and the medicinal. Were we to be influenced entirely by the alkalescent, and still more ammoniacal condition of the urine, we should recommend a diet as far removed as possible from the azotic, and to consist of a vegetable and acescent nature. But this purely chemical view is not sustained by experience; and Prout very judiciously recommends, when the constitution is deeply involved and much enfeebled, a generous animal diet, consisting principally of solids: fluid aliments, such as soups, should be sparingly used. All causes of exhaustion, either bodily or mental, must be avoided; and hence a change of air and scene, from the town to the country, produces a double good effect, by its operation both on body and mind. Of medicines, we select—1, sedatives, of which henbane and camphor are preferred by Prout, but in the severe cases, opium must be employed; 2, tonics, including *Pareira brava*,

acidulated infusion of roses, with sulphate of quinia, some preparation of iron, &c., and under this head the mineral acids, as far as they can with safety be used, in order to check and remove the alkalescency of the urine. General languor and debility will be obviated by the shower-bath, tepid or cold, according to circumstances, of prior habit, or present frame of body; and local, as uneasiness or pain in the back, by various plasters or liniments applied to this part. In severe idiopathic cases opium is almost the only means of present relief or comfort, — in doses of from one grain to five grains, twice or thrice a day. While we are attentive to procuring a regular state of the bowels, we must shun active purgatives, and especially all those of the saline class, even Seidlitz powders, and the common effervescing or saline draught.

When the irritation is chiefly restricted to the bladder, and the disease is in its earlier stage, before the constitution has yet suffered, leeches to the perineum, or cups to the sacrum, and purgatives, will be of service, and may often advantageously precede or accompany the use of sedatives; and these last, instead of being associated with tonics, &c., as in severe cases, may be much more beneficially combined with the citrate or acetate of ammonia.

Cystic oxide calculus is a rare disease. It was first described by Dr. Wallaston, its discoverer, from one taken from a boy five years old. Since then it has been found and described by Drs. Henry, Marcet, Venables and Bird, and Mr. Brande.

The *oxalic acid diathesis* is sometimes associated with serous urine, and with organic disease of the kidney. Among the symptoms, which are sometimes very slight, at other times evincing bodily suffering and mental excitement bordering on insanity, hemorrhage from the kidneys is perhaps more frequently produced by oxalate of lime, than by any other form of concretion. Fortunately, however, of the hundreds of individuals in whom the oxalic acid diathesis prevails, a few only suffer from calculus. The formation of a renal calculus of oxalate of lime seems to be generally an accidental circumstance; and, in almost every instance, the formation of such concretion depends either on the presence of some foreign body, or some local inflammatory action on the kidney. Among the exciting causes of this diathesis is, in Dr. Prout's opinion, a residence in a damp and malarious district. The influence of diet is very strong. Repeated instances have been seen in which the too free use, or rather abuse, of sugar has given occasion to the oxalic acid form of dyspepsia; and sooner or later, under favourable circumstances, to the formation of an oxalate of lime calculus.

The dietetic part of the *treatment* of the oxalic acid diathesis is nearly the same as that applicable to diabetes. Fermented drinks should be abstained from. The quality of the water is of the utmost importance. The medical treatment is chiefly analogous to that of diabetes. "The mineral acids, either alone or combined, are usually grateful to the stomach, and may be taken with advantage;

indeed, generally speaking, (says Dr. Prout,) I have seen more benefit derived from this class of remedies than from any other. The effects of the mineral acids must be watched; and when they begin to produce a deposition of the lithate of ammonia or of lithic acid, their use must be suspended." The distressing flatulence and irregular action of the heart, so often present in this affection, are relieved by hydrocyanic acid, or infusion of the wild-cherry tree bark.

Lactic acid, by some distinguished chemists believed to be merely a modification of acetic acid, is developed both in the primary as well as secondary assimilating processes. In the first, giving rise to dyspepsia, especially heartburn, &c., and unpleasant sensations and derangements of the lower bowels; and in the second, deranging more or less the renal secretion. The remedy for these disorders will be not so much a specific treatment, as the exhibition of alkalies, but an adoption of a suitable regimen by which all the assimilating organs will be rendered fitter for the rhythmical discharge of these functions.

After an account of the various states of the urine, evincing morbid secretory action in the kidneys, it would be in order to describe the solid deposits from this fluid, constituting calculi in the cavities of the kidney and in the bladder, or *renal calculi* and *vesical calculi*. But I must be content with having directed your attention to the various diathesis and the evidence of morbid concretions going on, and the outlines of treatment demanded on these occasions, and leave to yourselves the application of this knowledge to the treatment of the more confirmed stages of the disease. The symptoms of renal concretions, in general, are not distinctive from those of nephritis and neuralgia, and their real value can only be ascertained by a close attention to all the concomitant circumstances of the case. The formation and passage of lithic acid concretions are often attended with little or no pain; those of the oxalate of lime produce pain of a more acute character; and though principally referred to a particular spot over the region of the kidney, it is often discursive, and shoots in the direction of the ureter, epigastrium, or shoulder.

The presence of renal concretions being ascertained, as well by the physiological symptoms as by the chemical tests of their presence in part of similar matters in the urine, means should be taken for their expulsion. These consist, in the case of the lithic acid concretions, of the means to remove the so commonly associated congestions of the abdominal viscera; such as by cupping freely over the loins at the outset; and afterwards by active purgatives, including calomel and colchicum, or henbane if gout be suspected, conjoined with alkaline and diuretic remedies; among which, the tartrate of potassa or tartarised soda is perhaps the most efficient. When congestion is removed, the patient should be put on a plan of treatment adapted to the lithic acid diathesis formerly described; and be directed to take simple diluents in conjunction

with foot or horse exercise. Under this plan of treatment, sometimes alternated with the cautious use of diuretics of the terebinthinate kind, almost incredible quantities of sand and numerous lithic acid concretions, of various magnitudes, have been brought away. If the concretions are presumed to be of the oxalate of lime variety, the same general treatment is useful, including diuretic purgatives and diuretics, but with the substitution of dilute nitric acid with nitrous ether for the alkalies. Sedatives will be proper in all the cases, as also the warm bath. Concretions of the cystic oxide or of the phosphates will be met by the same general principles of cure. Nor do these differ during the actual descent of the concretions from the kidney. In plethoric subjects thus affected we cup the loins more freely, and give calomel and opium followed by fomentations and the warm bath.

Of *vesical calculi* my notice will be very brief. The symptoms of the presence of calculi in the bladder are detailed in every work on the practice of medicine, as well as of surgery: their precise composition can only be ascertained by an analysis of the gravel or smaller calculi passed with the urine, and of this fluid itself. Guided by this knowledge, we may sometimes, with good effect, prescribe a course of medicine, in which large dilution counts for a great deal, for the relief of the pain and more urgent symptoms, sometimes for a diminution of the size of the calculi, rarely for their solution and entire removal. The means of cure adapted to the indications furnished by the different kinds of calculi are the same as when the principles of which they are composed are secreted from the kidneys and deposited in the urine. The chief remedies are the alkaline class, persevered in for a length of time, — months and years, — in such doses as not to distress the stomach or interfere with digestion. The alkalies, in whatever shape exhibited, have an unquestionable and very remarkable influence upon the calculi of the bladder themselves, and upon the symptoms to which they usually give rise. A stone in the bladder, ascertained by sounding, and which caused its possessor torment hardly endurable, has been so far rendered innocuous by the protracted use of Castile soap and lime water, as scarcely to give any inconvenience. On this point refer to Willis, p. 184–190. The value of the alkaline bicarbonates especially, has been placed in a more conspicuous light of late years, by the experiments of Dr. Ch. Petit and M. A. Chevalier.

Hæmaturia, commonly defined to be a discharge of blood from the bladder, is in fact hemorrhage from the urinary organs, without specification of part. Sometimes the blood comes from the kidneys themselves, sometimes from the pelves or ureters, and often from the bladder. It is symptomatic of or caused by some other affection more frequently than it is idiopathic; and hence we meet with it in certain epidemics, as remittent and typhoid fevers; affections of the spleen and liver, and in scurvy. It occurs as an endemial disease in

some countries. In the isle of France, children from their earliest infancy are liable to this complaint, without suffering any pain, or its appearing to prejudice their general health. One of the physicians of that island says, that three-fourths of the children are affected at one time or another with hæmaturia. In these cases the bloody urine is generally observed to alternate with that which is chylous or sero-albuminous.

The most common cause of hæmaturia is the presence of some foreign body in the pelvis of the kidney, in the course of the ureter, or in the urinary bladder. The *treatment* will be modified by a knowledge of cause; and commonly will consist of a mild antiphlogistic course, viz., cups to the sacrum or leeches to the perineum; cold cloths to these parts, and on the hypogastric region; cold water enemata; the administration of sub-acetate of lead; or, if the patient have been subject to hemorrhoids, a few leeches to the anus will be of service. Prior constipation or any fulness of habit will require purging, at first with calomel and rhubarb, and afterwards with salines. More formidable cases are treated by injections of cold water, or of alum, in the proportion of forty grains to a pint of water, thrown into the bladder. Revulsives by warmth to the feet, and warm pediluvia, will be serviceable. When hæmaturia recurs often, without being caused by the irritation of calculi, and the subject is weakened by the discharge, or his system otherwise debilitated, some preparation of iron is of service. The muriated tincture has been given with good effect in such cases. When the hemorrhage is from the kidney, it sometimes lasts unchecked for weeks together, and then ceases without farther injury.

The chief diseases of the bladder are, inflammation or *cystitis*, and catarrh or *cystirrhœa*, with their modifications of irritability and spasm. Inflammation of the bladder may appear in one or more of its component tissues; but it seldom fails, except we call rheumatic or neuralgia attacks of the muscular tissue inflammatory, to involve them all. If the mucous coat be the first attacked, we have, besides the common symptoms of inflammation, those of irritable bladder. In the serous coat the symptoms will be those of partial peritonitis. In all these cases the sub-mucous cellular tissue is soon implicated, and then we have the symptoms of acute phlogosis of the bladder. These are, after rigors, acute burning and throbbing pain behind the pubes, and extending to the perineum, with heat and pain at the anus and rectum, and tenesmus, and frequent desire, with difficulty of discharging the urine. To these succeed symptoms of general reaction or fever. The urine is at first scanty, dense, high coloured, and turbid on cooling. If the disease is allowed to go on unchecked, the pain extends upwards through the abdomen generally, which becomes tense and tender; there are then nausea and vomiting, with great prostration, anxiety, and restlessness.

Cystitis may be caused by external injuries, by injudicious irritation of the bladder in certain operations, or by acrid diuretics;

metastasis of gout, and the like; and in females, by difficult and protracted labours, from the long pressure of the head of the child.

The *treatment* of cystitis will be pretty obvious from the symptoms. Venesection, followed by topical bloodletting from the sacrum, perineum, and anus, as may be deemed most advisable in consideration of any prior affection or concomitants of the case; in fine, the same measures may be advantageously adopted as were recommended for hæmaturia. Recourse will be had, more readily than in the latter case, to tartar-emetic, which will take the place of sugar of lead in the early period of the attack, as calomel will that of any tonics towards its close. Depletion having been properly practised, including adequate evacuation of the bowels by castor oil and mild mucilaginous enemata, a blister to the sacrum will do good service.

The chronic form of cystitis is often confounded with cystirrhœa, and, in fact, it at times terminates in this latter; and, conversely, cystirrhœa may be hurried into cystitis by injudicious treatment or accidental irritation. But true *cystirrhœa, catarrhus vesicæ*, is of primary origin, like analogous irritation in all other parts of the mucous system; running through its several stages, from that of irritation bordering on slight inflammation to increase of mucous secretion and solution of the disease. Like other forms of catarrh, it may originate from exposure to cold and moisture, and its effect, suppressed perspiration. More commonly it is caused by irritation and inflammation of the urethra, either from the violence of gonorrhœa, or other sudden stoppage of the discharge; and in either case there is an extension of the inflammation of the urethra to the mucous membrane of the bladder. But, it has been well said, that idiopathic catarrh of the bladder is just as rare in an acute as it is common in a chronic form. Its advance is insidious, so that it attracts little attention for a length of time. Finally, however, the uneasiness felt about the region of the bladder, the frequent calls to pass urine, and the mucus mixed with this fluid, together with sympathetic disturbances of the digestive canal, are clear indications of a developed and troublesome disease. The nervous system soon participates largely in these disorders, and the irritability, alternating with sadness and depression, and apathy, are great.

The urine, when examined, shows a large addition of flocculent mucous matter, which subsides from the general mass of the fluid, collects at the bottom, as in the acute disease, and forms a tenacious substance that will bear drawing out into ropes a foot and more in length without breaking. As the disease advances, the urine undergoes further changes; its urea suffers decomposition, and it is rendered both acrid and intolerably offensive. The continued irritation of diseased bladder produces hectic and marasmus, which, if not arrested, ultimately prove fatal.

Cystirrhœa is described to be, as it is truly, a disease, for the most part, of aged people. I have seen it, however, in young subjects; and one of the worst cases which I ever met with was that of a

young man, about twenty-five years of age, who finally sank under the disease.

The *treatment* must vary with the constitution and age of the patient, particularly as regards preliminary depletion, which, in some instances, gives great relief. In the case just referred to, I found the sufferings of my patient, up to the last few months of his life, relieved for a longer period by cupping over the sacrum, or leeches to the perineum, than by opium, or any combination of sedatives that I could devise; even, too, when his general circulation and other organic systems manifested very feeble action. Laxatives and demulcent drinks constitute an important part of the treatment. After these opium with small doses of magnesia, which last is preferable to any of the alkalies, injections of laudanum if the pain be great and persistent, or the irritability of the bladder prevent sleep, will be put in requisition. I have found, on some occasions, nothing soothe so much the sufferings of the patient as cold water enemata. After the subsidence of inflammation recourse is had to some medicines of the balsamic tribe, of which copaiba is the best. This medicine is highly lauded in this disease, taken by the mouth, and injected into the rectum; and in many cases undoubtedly deserves its good character. But my own experience is coincident with Mr. Liston's, in leading me to prefer cubebs, in doses of twenty grains twice or three times a day, to which I often add half the quantity of uva ursi and the same proportion of magnesia. I have succeeded in relieving for a time, by this prescription, a person whose calls, for years, to pass urine, were almost continual, night and day. Under the use of the cubebs she was so much benefited, that in the course of a fortnight she was able to go out everywhere with freedom; and could retain her water easily for three hours to three hours and a half. In a few weeks, however, the disease returned; the same remedy was prescribed, but its effects were no longer as beneficial as before. The balsam was then used, but without effect; nor was I more successful with a short trial of strychnia. Enemata of oil of turpentine with yolk of egg, blister to the sacrum, injections of warm water, or of a solutions of morphia into the bladder, have been generally recommended and used. I have tried them all, but without any encouraging results. Sulphate of quinia and analogous tonics are sometimes serviceable, at other times again seem to aggravate the disease. Much stress is laid by some writers on an issue established in the perineum, as decidedly more remedial in its effects than a similar drain and counter-irritation on the sacrum or spine higher up. Blisters on the inside of the thighs sometimes give partial relief. Even in the chronic form of the disease, after the use, so generally ineffectual or partially successful, of balsams, I have succeeded in giving comparative comfort for weeks to a patient by small doses, two and three times a day, of emetic tartar; and have directed the application of this medicine to the sacrum, as an external counter-irritant.

The opposite in some respects of cystirrhœa is *ischuria vesicalis*, or retention of urine. In this latter the kidneys, unlike that which

occurs in ischuria *renalis*, perform their office as usual, and the urine makes its way into the bladder; but from some cause it cannot be ejected from that organ. In this case there is more or less pain and uneasiness in the region of the bladder, accompanied, for the most part, in the earliest stages, at least, by an urgent desire to pass off the urine. The distended bladder forms, in most instances, a swelling above the pubes, not only perceptible to the touch, but sometimes, even to the eye; and the drawing off the urine by the catheter, if this can be effected, always gives great and immediate relief to the patient's sufferings.

The cause of retention may be inflammation, spasm, or mechanical obstruction at the neck of the bladder or urethra, or a combination of these causes. Retention of urine is also an attendant or consequence of hysteria, of paralysis, or of other affections of the bladder, such as a preternatural thickening of its coats, &c. If long continued, it causes suppression of urine, or it may end in rupture, gangrene, &c., of the bladder.

According to the cause will be our treatment. If inflammatory symptoms prevail, we have recourse to free venesection and cupping over the sacrum and loins, antimony, &c.: if spasm be present, opium is to be given by the mouth and enema; also belladonna, particularly in the form of extract rubbed on the perineum and pubes, or introduced as a suppository into the rectum. The muriated tincture has acquired great reputation in this last mentioned state. Failing soon to cause the bladder to evacuate itself, we must introduce the catheter and draw off the water; and here I may mention, parenthetically, that the best for one who is not a practised surgeon, is the common-sized silver catheter. If there be symptoms of paralysis or weakness of the spine, moxa, or a small blister is to be applied to this part, and iron and strychnia given internally. When there is associated derangement of digestion, the blue mass, alternating with magnesia and bicarbonate of soda, will answer a good end. The prognosis in retention of urine occurring in old persons is not favourable. We must not be surprised at sudden death, preceded by apoplexy or paralytic seizure.

As regards the proportion of cases of urinary diseases in the two sexes, in England at least, we learn that they destroy five times as many males as females — the rate of mortality under this head having been ·199 and ·087 per thousand. This disparity has been ascribed to mechanical causes; but will a mechanical explanation account for the fact, that sixty-eight males, and only twenty-eight females, died of diabetes? Dr. Yellowly, in a paper published in the Philos. Trans. 1829, estimated that one in one hundred and eight thousand persons was cut annually for stone in England and Wales. It appears from the table, that forty seven in one million males, and five in one million females, die of stone and gravel. The latter, it must be admitted, is a vague term in popular language; but the mortality from stone is certainly one in one hundred thousand annually." — *Registrar's Report*, page 105.

DISEASES OF THE RESPIRATORY APPARATUS.

LECTURE LV.

General Principles of the Diagnosis of Thoracic Disease.—Connexion between symptoms and physical signs—Physical and vital conditions of the thorax—Great assistance to diagnosis of diseases of the chest, furnished by physical signs—Difficulty from symptoms alone—Mutual dependence of signs and symptoms—Sources of physical diagnosis—Insufficiency of signs alone—Review of the different signs—Auscultatory phenomena; passive and active.

It cannot be doubted, that the labours of modern pathologists in the localisation of disease, overrated though they, perhaps, have been by the disciples of certain schools of medicine, have yet done much to remove that great reproach of the art — its uncertainty. The discoveries of the different and numerous seats of morbid action, led, directly, to the study of the symptoms of these lesions, and of those physical phonomena, which resulted from, or accompanied them; and thus has the science of diagnosis been placed on a sure basis, that time, with its mutations of opinion, can never shake.

In the recognition of the seat and nature of disease, it is obvious that a great number of circumstances must be taken into consideration, besides the actual signs and symptoms of the affection. Age, sex, habit, exciting cause, and duration of symptoms, all form links in the chain of evidence on which we ground our opinion; but it would appear, that it is in the study of what are termed the signs and symptoms of disease that we have made the greatest advances in modern times.

By morbid signs, we mean phenomena, recognisable to the senses, but particularly to those of sight, touch, and hearing, which are evidences of physical alterations in the conditions and relations of parts. These alterations may be enumerated: as changes in colour, shape, and volume; changes in resistance; peculiarities of feel; and lastly, the production of particular sounds, under certain circumstances, perceptible either with or without the assistance of mediate auscultation, and either wholly new or characteristically altered. To the diagnosis founded on the observation of these phenomena we give the name of physical diagnosis, inasmuch as by it, that is to say, by the observation of physical signs, we recognise certain physical alterations of parts, which may be studied without reference to those functional lesions which have preceded, accompany, or follow them. Thus, the feeling of fluctuation reveals the existence of a fluid, but tells us nothing of its cause. The sound of fluctuation shows the coexistence of fluid and air, which may arise from different diseases. The signs of gurgling and cavernous respiration in the lung point out a cavity communicating with the bronchial tubes, and containing some fluid, but the cavities which

produce these phenomena may be of various kinds — gangrenous, phthisical, pneumonic, &c. Dulness of sound of the chest points out an obliteration or displacement of the air-cells, and the substitution of a solid or liquid for air, a condition which may arise from various causes. The sensation of friction only points out a roughened condition of serous membranes, but reveals nothing as to its cause. The deviations of shape and volume of the great cavities indicate some anormal state; but when we seek for their causes, we must have reference to other sources of information. These illustrations of physical signs might be extended, but enough has been said to explain the true signification of the term.

We may consider symptoms as different from signs in this: that while the signs belonging to sight, touch, and hearing, are founded on physical conditions of the organs themselves, symptoms result from changes in the functions of the suffering organs, and in the modifications produced by disease in their vital relations with other parts. And hence we consider symptoms in a threefold manner:

1st. Changes in the functions of the part itself.

2d. Changes in the phenomena of organic life in various parts of the system.

3d. Changes in the phenomena of animal life.

Thus, in examining the symptoms of a disease of a particular organ, we investigate the state of its own functions. We then examine the changes caused by disease in all the phenomena of organic life — such as digestion, respiration, circulation, absorption, nutrition, exhalation, secretion, and animal heat. From these, we advance to the phenomena of the life of relation, and examine the changes produced in the muscular power or function, the organs of sense, the moral affections, and intellectual manifestations.

In a case of acute inflammation of the lung, we observe, in the first place, lesions of its own function, painful and hurried respiration, imperfect arterialisation of blood, cough, and expectoration; these are what may be called local symptoms, but we may have others referrible to the disturbance of organic life in parts distinct from the lung; thus we observe excitement of the heart, fever, and various derangements of the digestive and urinary systems; further, in certain cases there may be signs of a lesion of the phenomena of the life of relation, as, for instance, prostration of strength, and other signs of derangement of the cerebro-spinal system.

It must be obvious that, in the detection of the nature and seat of any disease, the more we can combine the observation of physical signs with functional symptoms, the greater will be the accuracy of our diagnosis. Now, if we compare together the diseases of the three great splanchnic cavities, we find that those in which this desirable combination is most attainable, are, first, those of the chest; next, the abdomen; and lastly, the affections of the brain and spinal marrow. Accordingly, if we compare the diseases of these systems with respect to the perfection of diagnosis, we find the order to be,

first, the respiratory; next, the abdominal; and last, the cerebro-spinal, or that in which this combination is least applicable.

We shall enter on this subject by remarking, that the contents of the chest in the healthy and diseased state are most favourably circumstanced for the multiplication and distinctness of physical signs. And it is obvious, that the great improvement by which the present time is distinguished in the diagnosis, and, consequently, the treatment, of thoracic disease, is traceable to this circumstance.

In confirmation of the former proposition, let us consider —

First. That of the different cavities of the body, the chest is that in which the existence of air in quantity is a natural condition. It is wanting in the cranium; and when occurring in the abdominal cavity, may be generally considered as a morbid production, or an excretion. But the chest is the receptacle of air for the body. Now it is easy to show that, other things being equal, the sound, on percussion, is directly as the quantity of air within the chest; and the applicability of this to diagnosis is at once seen when we consider that the effect of every organic change of the lung is to diminish or to increase the whole quantity of air within the thorax, and, of course, to cause a corresponding increase or diminution of the natural sound.

Secondly. We must recollect the remarkable separation of the viscera, on either side of the chest. In fact, of all the organs which, in the life of the embryo, and by the law of eccentric development, are formed primitively double on the median line, there is none that preserves its duplicity more completely than the lung. The brain, it is true, is separated into hemispheres, and the liver into a right and left lobe; but the union of opposite portions of either organ is much more complete than what is found to exist in the lung; and the latter, also, with the exception of the testicle, is the only organ of the body whose original symmetrical halves are covered by separate serous membranes. The importance of all this to physical diagnosis is immense, for it is on this circumstance of separation that its true principle, *comparison*, mainly depends.

If this great separation of the lungs did not exist — if, in place of their being merely connected by their vessels and air-tubes at the root, they were fused by continuity of their parenchyma, and covered by the one serous membrane, as the liver or brain — then the diagnosis of the exact seat of disease, which we will see is of the greatest practical importance, could not be attained; and it would be indeed difficult to discover an empyema, a partial pneumonia, or an incipient phthisis. Further the division of the lung into lobes, although these portions be not wholly separated, is yet advantageous in the same point of view, as these divisions act more or less in circumscribing diseased action, and of course increase the applicability of the principle of comparison.

Thirdly. The thoracic viscera differ widely from those of the cranium or abdomen in the constant, uniform, and extensive

motions which their functions require. These, whether of the lungs or heart, whether active or automatic, are perceptible by physical signs, and thus we have a standard by which many departures from the healthy condition may be easily estimated. It may be said, indeed, that this circumstance of motion is not peculiar to the lung or heart. But, while we admit the existence of the motions of the brain, we must remember that they are slight, and, in the adult, totally concealed by the bony cranium, while those originating in the viscera of the abdomen are irregular, and often imperceptible. Now, on the existence of these motions depends much of the physical diagnosis. If we look to the lungs merely, we find that the act of respiration causes phenomena appreciable by the ear, eye, and touch. The murmur produced during inspiration and expiration, and the alternate contractions and expansions of the chest, evident both to sight and feeling, all furnish most important physical signs in cases of disease. Thus, in Laennec's emphysema, when the disease has been carried to a high degree, we find that, on account of the great volume of the lung, the murmur produced is feeble, and the expansion and contraction of the chest is trifling, as compared with the effort of the respiratory muscles. These circumstances may often suffice for the recognition of the disease. Again, in certain cases of empyema, we can easily recognise the absence of motion on one side, and the corresponding increase of expansion on the other. Many more examples might be given.

Further, the regular motions of the heart, productive as they are of peculiar impulses and sounds, are not only directly available for the detection of cardiac and aortic diseases, but also for those of the lung, as will be abundantly shown in the progress of this work.

Fourthly. The thoracic cavity is the only one in the diseases of which the phenomena of the voice can be made available for diagnosis. It is true that, of the various physical signs, these are, perhaps, of the lowest value and most liable to mislead; but when combined with other circumstances, they become of important assistance in the detection of pulmonary disease. There is one case of disease of the circulating system, (aneurism of the aorta,) in which we may avail ourselves of the signs drawn from this source.

Fifthly. Great assistance is derived in the detection of pulmonary and cardiac disease, from the peculiar modifications of shape which the chest undergoes from a number of causes. If we look to the affections of the head and spinal cavity, we find that, with the exception of some few cases of congenital dropsy, arrest of development, or chronic effusion, the more frequent diseases of this class do not produce any perceptible alteration or change of shape in the bony cases of the cerebro-spinal mass. In the abdomen, on the other hand, from the very yielding nature of its parietes, changes of volume and shape are common; but it will be found, that these seldom are available for the detection of the nature of their cause — a circumstance as well attributable to the great yielding of

the parietes, as to the fact of the viscera being contained in a single cavity. The chest, however, presents bony, elastic, and fleshy parietes, and its principal viscera occupy *three distinct cavities.*

Although it cannot be maintained that the alterations of shape and volume of the chest will always suffice to point out the nature of their causes, yet we must admit, that, with respect to the diseases of its interior, the modifications of its exterior are more numerous, and of greater diagnostic value in the chest, than in either of the other two cavities. Let us consider the extraordinary convexity of the whole chest, the arching of the sternum, and the appearance of the shoulders, in a case of dilatation of the air-cells; the loss of symmetry in the sides, and the peculiar smooth appearance produced by the pressure of the fluid on the intercostal spaces, in the case of empyema; the contraction of the side and depression of the shoulder, while the spine remains unbent, in the same case, where absorption of the fluid has taken place; and the sunken and flattened appearance of the antero-superior regions in advanced phthisis. All these are instances of peculiar modifications of shape of the exterior walls of the cavity, coinciding with physical changes in the subjacent viscera. It is true, that taken alone they could not lead to a positive diagnosis; but when combined with other signs and symptoms, their value is highly important; and this, with their number, should make us admit, that, as a means of diagnosis, the modifications of external form, produced by disease, are more valuable, and much more frequently applicable, in thoracic than in the cerebro-spinal or abdominal affections.

Sixthly. The thoracic viscera, at least as far as the lungs are concerned, differ most remarkably from the cranial and the abdominal, in the facilities furnished by their structure and function for the detection of disease, by the direct recognition of the products of that disease. The conditions on which these facilities are found to depend, are various; but the principal are, separation, mobility, elasticity, and their direct and universal permeability to air, by means of the bronchial ramifications. Of these, the last is the most important.

Thus, if we look to the brain with respect to the discovery of effusion, in a case of arachnitis, we find that there is no direct physical sign of such a lesion, and its presence can only be guessed at by the existence of certain symptoms, which modern researches have shown to be extremely fallacious (See Andral, *Medical Clinic — Diseases of the Encephalon*). We have no physical means of ascertaining its presence or absence. But how different is the case with the lung, in which, by the assistance of percussion, by the observation of changes of position, by the characters of respiration and of the voice, and by the observation of the displacements of the lung itself, the heart, and the abdominal viscera, the detection of a fluid in the serous cavity becomes as easy as it is certain. Again, let us compare the facility of diagnosis of an abscess of the cerebral

with that of the pulmonary substance; here, also, the existence of the first lesion can only be determined by the study of functional alterations; there is no physical sign, and we must farther admit, even after the researches of a Lallemand, a Serres, a Foville, or an Abercrombie, that he who would make the positive diagnosis of such a lesion, must have a confidence not justified by the present state of the science.

But if, in a case of pneumonia, after the recognition of the ordinary symptoms and signs of the disease, we discover the phenomena of cavernous respiration, gurgling, and pectoriloquism in the affected portion of the lung, we know that there must be a cavity of some kind, and of its nature, our previous observations leave scarcely a doubt. Here, the facility of diagnosis would not exist, if, like the brain, the lung had been a closed organ; but its permeability to air, and the regular and forcible entrance and expulsion of this fluid into and from its cavities, are the conditions which, by enabling us to discover new secretions and organic changes, easily reveal the lesion.

The same train of reasoning applies to the diseases of the parenchymatous organs of the abdomen; the liver, spleen, kidneys, pancreas, and mesenteric glands. Here, for the same reasons, neither auscultation nor percussion can apply, unless in a case of mere enlargement, when the latter mode of investigation can be sometimes employed. Abscess of any of these organs cannot be accompanied by signs similar to those of abscess of the lung; nor are there any physical means which assist in detecting the earlier stages of inflammation. Nothing is so easy as to detect the suppuration of pulmonary tubercles; but in the case of the abdominal organs, even supposing that tubercles were recognised, who could pronounce upon their actual state?

Further, in comparing the diseases of the gastro-intestinal with those of the pulmonary mucous membrane, with respect to the facility of diagnosis, we are at once struck with the difference in favour of the latter. There is no physical sign proper to a gastro-enteritis, and its detection must depend altogether upon vital phenomena; but in the case of bronchitis, we have, in addition to the functional lesion, a group of signs resulting from the physical changes of the part, which often enable us to detect the slightest shade of mucous irritation, and to pronounce on the exact locality, extent, and stage of the disease.

Lastly. If we consider the chest as to the mechanical nature of its walls, and the mobility of its contained viscera, we see that, in its diseases, a fruitful source of physical signs is contained in the various and remarkable displacements, not only of these viscera, but of those contained in the cavity of the abdomen — a source of diagnosis not applicable to the diseases of the brain, and scarcely to those of the digestive system.

Thus, a moderate effusion into the pleura will displace the lung from below upwards, acting but little on the side, on account of its

greater resistance. When more extensive, it presses the lung against the mediastinum, and, in consequence of this septum yielding more than the bony wall, it is pushed beyond the median line, of course carrying with it the heart, either to the right or left side, as the case may be. Now, all these displacements of the lung, mediastinum, and heart, are easily appreciable by physical signs.

But we observe displacements of the abdominal viscera consequent on thoracic disease—a circumstance explicable by considering the nature of the floor of the thorax; that it is not, as the rest of its parietes, bony or cartilaginous, but formed principally by muscle and some tendinous expansion. Under circumstances of great accumulation of fluid, or of hypertrophy of the lung, this muscular wall yields to pressure; its convex surface becomes flattened, or even concave; the viscera of the abdomen, on the side corresponding to the affected lung, are pushed down before it, and, from their displacement, a new and most important source of diagnosis is obtained. It is true that the reverse may happen, and the thoracic viscera shall be displaced by abdominal disease; thus, an enlarged liver or spleen, an abdominal aneurism, or an accumulation of air or fluid in the belly, by pressing on the concave side of the diaphragm, may displace the lung or heart; but it is obvious, that when we consider the difference between the abdominal and thoracic walls, and the yielding nature of the latter, such can only occur in very extensive disease. It is plain, too, that the natural action of the diaphragm will tend to diminish these effects, while in the former case it could have no such influence; and it will be proved in the following pages, that an amount of pressure on the concave side of the diaphragm, carried even so far as to displace the superjacent viscera, does not deprive it of its contractile power.

If we take a general view of the cranial, thoracic, and abdominal cavities, it would appear that in none of them is the diagnosis of disease, from symptoms alone, so difficult as in the chest. But further investigations will prove to us, that there is no cavity in the diseases of which (when we combine the study of symptoms, properly so called, with that of physical signs) the determination of the nature, extent, and modifications of disease, is so easy and certain. In fact, the diagnosis of thoracic disease is founded on the combination of signs and symptoms, and we shall find, that of all the cavities the chest is that in which the physical signs are most numerous, and of most extensive application.

The nature of thoracic disease may be occasionally determined by the consideration of signs, or the observation of symptoms; but it is obvious that the more we combine the two, the more exact will our diagnosis be. In diseases of the thoracic viscera, there is a greater necessity for mechanical diagnosis than in those of the brain or abdomen, for the general resemblance of the symptoms of the different thoracic diseases is much more striking than that of the cranial or abdominal affections.

In the case of the brain, we can often distinguish between arachnitis and deep-seated local inflammation. In that of the abdomen, it is not difficult to distinguish between a mucous and a serous inflammation; nay, we are even able to distinguish between the disease of the different portions of the mucous expansion, as between gastritis, duodenitis, ileitis, and inflammation of the large intestine. But in the case of the thorax, this accuracy from symptoms alone is too often inaccessible. Pain, dyspnœa, acceleration of breathing, cough, and expectoration, are the prominent characteristics of a great number of essentially different diseases.

It has been asserted, that by studying the varieties in the nature, mode of occurrence, succession, and modification of these symptoms, we can, independently of the information derivable from physical signs, arrive at an accurate diagnosis of thoracic disease. This is the common assertion of those few who are still opposed to the use of mechanical diagnosis. It is not to be denied, that in many instances the physician, without the aid of the stethoscope or percussion, may arrive at a sufficiently accurate diagnosis, and that, before these modes of ascertaining chest disease were introduced, the nature of many cases was correctly determined; but I feel no hesitation in saying, that for the attainment of such accuracy, the combination of careful observation, uncommon tact, and long experience, is absolutely necessary. In other words, that there must be qualifications which it is next to impossible any young practitioner can possess. And, after all, however painfully and slowly this power of diagnosis has been acquired, it is still imperfect—as assertion well borne out by the comparison of the state of our knowledge previous and subsequent to the discoveries of Laennec. The prominent symptoms of chest affections which have been enumerated, may occur in the same order and the same manner in many essentially different diseases; in bronchitis, pneumonia, tuberculisation of the lung, and pleuritis. Every one who has studied chest affections must have seen examples of all these cases, accompanied by symptoms exhibiting a resemblance which would puzzle the most profound and accurate symptomatologist. Now, supposing that the character and succession of the symptoms were the same, and the diseases of equal frequency, and that we were to fix upon any one disease as the cause of these symptoms, there would be three chances to one against our coming to an accurate conclusion.

I am quite aware that many persons will object to this, and maintain, that although these symptoms occur in the above mentioned diseases, and even in the same order, yet that their nature is different. In the characters of expectoration, for instance, sufficient data for ascertaining the nature of its cause may exist; thus, in advanced phthisis it is purulent; in bronchitis, mucous; in pneumonia, bloody; and so on. All this, though true to a certain degree, is yet, when generally applied, far behind the actual state of medicine, which has proved that we may have in each of these principal diseases every variety of expectoration, or no expectora-

tion at all; and we may extend the same kind of observation to the cough, dyspnœa, acceleration of breathing, and pain.

It may be said, that besides those mentioned there are other symptoms capable of assisting in diagnosis; as, for instance, the mode of decubitus, or the occurrence or non-occurrence of hectic. But both of these are equally fallacious. A patient with the most enormous empyema shall lie on the healthy side, and hectic is often absent, though the lung be full of suppurating cavities, or well marked without a tubercle in the lung. And, with respect to the occurrence of fever in general, it is notorious that every disease of the lung may be apyrexial, or occur with all varieties of fever.

Lastly, the advocates of physical examination may well appeal to the frequency of the latent affections of the lung, as showing the necessity of this mode of investigation. The lung may be hepatised without cough, dyspnœa, acceleration of breathing, pain, expectoration, or fever. But this change cannot occur without the existence of physical signs sufficient for its detection, and nearly the same remark is applicable to many other instances of pulmonary lesion.

It is plain that the study of symptoms alone cannot lead to accurate distinction of chest disease; the same remark is applicable to that of physical signs, unconnected with symptoms. Symptoms are insufficient without signs, and signs insufficient without a careful comparison of these with the symptoms. There is no such thing as a perfectly pathognomonic symptom or sign of any thoracic disease. We must combine the lights drawn from the careful study of symptoms, both past and present, with the observation of physical signs, for by this mode alone can we hope to arrive at an accurate result. Great injury has been done to the cause of physical diagnosis by some inexperienced men, who, departing from the principles of its illustrious founder, have neglected too much the study of symptoms. To this subject I shall hereafter recur.

Let us now enumerate the sources of physical diagnosis.

1st. *Signs* purely acoustic, including the results of percussion and of auscultation, mediate and immediate. It may be observed here, that of all the signs these are of the most universal application; there being no disease of the lung or heart in which they do not occur.

2d. *Signs* derived from the alterations of shape and volume of the thorax. This source of diagnosis is capable of application to many, though by no means to all the diseases of the lungs, heart, and great vessels. Changes of shape and volume imply either the existence of acute diseases, in which the products of the disease have rapidly accumulated, or, which is the more frequent case, of diseases which have a great degree of chronicity. Under the first head we may reckon rapid liquid effusions into the pleura or pericardium, the result of inflammation, and recent pneumothorax, from fistula. Under the second, we have chronic liquid and aëri-

form effusions, hypertrophy and atrophy of the lung, both the result of chronic disease, and aneurismal or other organic tumours.

3d. *Signs* referrible to the sense of touch: these we find to occur in a considerable number of thoracic diseases; as, for instance, in bronchitis, with effusion; in dry pleurisy and pericarditis; in various diseases of the heart and great vessels; in abscesses of the lung, communicating with the bronchial tubes; in certain cases of liquid effusions into the serous cavities; and in hepatisation of the lung.

4th. *Signs* derived from the inspection of the motions of the thorax during respiration: these occur in cases of local or general impermeability of one lung, and in cases where the motions of respiration are otherwise impeded or altered.

5th. *Signs* derived from the inspection of the thorax, with reference to the action of the heart and great vessels.

6th. *Signs* derived from the existence of an external collateral circulation, as indicative of the existence of obstruction of the great internal venous trunks, such as the cava and innominatæ.

7th. *Signs* derived from the observation of the displacement of the thoracic or abdominal viscera: of these, some may be appreciable by the senses of sight and touch merely, while others must be ascertained principally by that of hearing. The displacement of the heart (perceptible to the eye and touch), and the protrusion of the liver into the abdominal cavity, are examples of the first division; while the displacements and compression of the lung, from liquid or aëriform effusions into the serous sacs, furnish examples of the second.

Now it is never to be forgotten, that although in these various classes we have a vast number of well-marked and essentially differing physical phenomena, *there is not one of them which, taken singly, can be considered as a pathognomonic sign.* Nay, *we might go farther, and declare that no possible combination of them can be considered absolutely pathognomonic.* By some of them, taken singly, or by various possible combinations, we may, indeed, ascertain the existence of certain mechanical conditions of the intra-thoracic viscera—as, for instance, permeability or impermeability; increase or diminution of the quantity of air; the existence of cavities of various sizes and with various communications; the roughened state of a serous membrane; or the displacement of particular organs: but if we seek to determine by physical signs alone, the cause of all or any of these phenomena, we shall find it to be difficult or impossible. It is only, as we have said before, by the connexion of the accurately ascertained physical signs with the previous history and actual symptoms of the case, that a correct diagnosis can ever be arrived at.

In order to establish the proposition that no physical sign, taken singly, can be considered as pathognomonic, let us take a brief view of these different signs, commencing with those least frequently applicable, and proceeding to those of most common occurrence.

1st. *Existence of an external collateral venous circulation.*— This appearance, which has been described by Reynaud, is indicative of a great amount of obstruction to the internal venous circulation. But of the nature of that obstruction it alone can tell nothing. It may proceed from the pressure of a tumour, aneurismal, or otherwise, or from disease on the internal surface of the venous trunk itself. This was observed to occur in the vena portæ and inferior cava, in a patient whose case is described by the same author, and in whom the superficial veins of the abdomen took on a supplementary action.

In obstructions at the right side of the heart, the dilatations of the jugular veins, so long noticed, seems to be the commencement of the same morbid appearance; and Dr. Graves has shown, that a varicose state of the superficial thoracic veins may occur from cancerous degeneration of the lung itself.

If, for the sake of argument, we assume that these different causes, for the appearance in question, were of equal frequency, and that from it alone we determined on the existence of any one of them, there would be four chances to one against our making a correct diagnosis.

2d. *Signs derived from the displacement of the thoracic or abdominal viscera.*— Of these, those that are most frequently recognised are the displacements of the heart and liver; the first is commonly observed in cases of empyema, the displacement to the right of the median line occurring in empyema of the left side, while that in the opposite direction indicates accumulation in the right pleura. Now, although displacement of the heart to the right side of the sternum constitutes one of the best indications of empyema of the left pleura, yet, taken alone, it is anything but unequivocal. A tumour, or an hypertrophy of the left lung, may produce a pulsation to the right of the sternum; the same may be caused by an hypertrophy and dilatation of the right cavities of the heart. And Dr. Graves and I have shown, that an aneurismal of the aorta may push the heart to the right side. I have also published the particulars of an extraordinary case of dislocation of the heart from external violence, in which the organ was driven far to the right of the median line, and in which no sign of empyema of the left pleura had ever occurred. When I come to treat of the affections of the heart, I shall give the particulars of this case. Lastly, well-attested examples of congenital displacement of the viscera have been recorded, in which the heart was placed at the right of the median line. On the other hand, displacement of the heart towards the left axillary region is a circumstance, which, from its nature, is commonly overlooked, and which may occur from other causes. I may also remark, that the previous contraction of either side, from a former attack of pleurisy, should be added to the possible uncertainties of this source of diagnosis, for, in such cases, the heart seldom resumes its normal situation with respect to the healthy side.

As the displacement of the heart, considered alone, and without

reference to any acoustic observation, is reducible, as a sign, to the mere feeling or seeing its pulsations in an abnormal situation; so, the displacement of the liver is reducible to the observation of a tumour in the right hypochondrium. Now, even supposing that the case was one of displacement of the liver, it will be shown that this might arise from other causes than empyema, to which it is commonly attributed: intra-thoracic tumours may produce it. I have observed it from Laennec's emphysema; it may occur from aneurism of the abdominal aorta, or from that of the hepatic artery; and I need scarcely remark, that we may have hepatic tumours, independent of any disease of the pleura, and conversely, pleural effusion without this sign. These observations are sufficient to show, that displacements of the heart or liver cannot alone be looked upon as certain diagnostics of the lesion which has produced them.

3d. *Signs derived from the inspection of the motions of the thorax during respiration.* — I shall not occupy your time with any commentary upon this class of signs. The respiratory movements are so infinitely various in the different diseases of the chest, that we are not warranted in founding any certain diagnosis upon the observation of them alone.

4th. *Signs referrible to the sense of touch.* — This class presents to us several signs, which, as far as they go, lead to a greater degree of certainty than those in the preceding one. Yet, like the other physical signs, they only reveal to us, and that not constantly, mechanical conditions, without leading to the diagnosis of the nature of disease, or the pathological state of the viscera. Thus, the bronchial vibration may occur from any liquid effusion into the tubes, and with various states of the lungs. The feeling of gurgling may proceed from a tuberculous, pneumonic, or gangrenous abscess, or from a dilated tube containing muco-puriform matter. The cause of the sensation of friction has not been sufficiently investigated, but we know that the rubbing feel may arise in various states of the serous membranes; while that of non-expansion of parts of the lung will obviously be produced by many different causes. The cases in which the sense of touch leads us to most certainty in diagnosis are those of the diseases of the heart and great vessels; yet every practical man knows, that the most violent impulses occur without organic disease of the circulating system, while, on the other hand, extensive hypertrophy of the heart may exist with a natural impulse, and an aneurism of the aorta give no morbid pulsation.

5th. *Signs derived from alteration in the shape and volume of the thorax.* — In this class of signs we meet with some of considerable value; thus, the convexity of the chest in Laennec's emphysema, when carried to a great degree, is an appearance almost peculiar to the disease; and which, combined with the elevated shoulders and the hypertrophied state of the muscles of the neck, will scarcely mislead. But of the various partial dilatations and contractions there is no one at all pathognomonic: many of them may be con-

genital, or the result of former, and of various diseases. Thus, dilatation of either side may arise from emphysema, pneumothorax, pleural effusions of various kinds, effusions into the pericardium, enlargements of the liver, or aneurisms of the aorta. An apparent dilatation, too, may exist, in consequence of the contraction of the opposite side; and contraction itself may arise from a variety of morbid causes, or be a congenital conformation.

6th. *Signs referrible to acoustics.* — These have been hitherto divided into those obtained by *percussion*, and by *mediate* or *immediate auscultation;* a division which seems to be unnecessary, as both classes of signs, being appreciable by the ear alone, should be ranged under the general head of *auscultatory phenomena.* Under this head, therefore, we shall treat of percussion, and auscultation, whether mediate or immediate. Previous, however, to our entering on an investigation of their value as diagnostic means, we shall briefly describe the principles of these modes of diagnosis. It is plain, that we have acoustic phenomena referrible to a passive and an active state of the lung; in other words, to conditions, on the one hand independent of motion or life, and on the other, inseparable from them. The passive phenomena, or those of percussion, which relate merely to the quantity of air within the thorax, may be as well observed in the dead as in the living body; while the active, or those of respiration, the voice, or the phenomena of the heart and arteries, imply motion and life. Hence, we may divide the phenomena of auscultation into those of the passive and active conditions.

Passive Auscultatory Phenomena. — The great object of percussion is to determine the diminution or increase of the quantity of air within the thorax, or in certain portions of that cavity. It has been already observed that of the different cavities in the body, the chest is that in which the existence of air in quantity is a natural condition; and it need scarcely be repeated, that in the normal state of the cerebro-spinal cavities, air, in a free state, is always wanting. We know, also, that when it occurs in any part of the abdomen, it is either the product of disease, of the fermentation of the ingesta, or of a secretion from the mucous surface, by no means constant in its occurrence or quantity; but the chest is the great receptacle for air, and, from the first moments of extra-uterine life, contains a vast quantity of it. Upon this peculiarity does the employment of percussion depend, because, *cæteris paribus*, the sound on percussion is directly as the quantity of air contained within the thorax.

Now, the result of almost every organic disease of the lung or heart is to diminish or increase the capacity of the thorax for air, and consequently to diminish or increase the sound on percussion; bearing this in mind, we find that the greater number of thoracic affections tend to diminish the quantity of contained air, and consequently are accompanied by a proportional decrease of sound, while the smaller (very few in number) have the opposite effect and results. If we consider that the general result of most of the organic diseases is to cause impermeability of the lung, produced either by disposition within, or pressure without the organ, we shall

see that the principle above stated holds good; thus, in pneumonia, congestion, œdema, pulmonary apoplexy, tubercle, cancer, and hydatid of the lung, portions of the lung, more or less extensive, which had previously contained air, are now filled by a fluid or solid substance. Even in bronchitis we can have no doubt that the sound on percussion is diminished in proportion to the turgescence of the mucous membrane; a fact observed by Avenbruger in the exanthematous diseases. It is true, that the diminution of sound is generally so slight as to escape our means of detection; yet that it exists even in the first stages cannot be doubted; and when secretion takes place to any degree into the bronchial tubes, the diminution of the quantity of air can be generally detected by percussion.

The same result is observed in all those cases of disease of the pleura or pericardium, in which a liquid effusion occurs. In these cases as in the former, we see a similar effect, though from a different cause: namely, the obliteration of air-cells, the diminution of the quantity of air, and the occupation of its situation with reference to the thorax, by a medium giving a dull sound on percussion. The same remarks are applicable to enlargements of the heart, aneurisms of the aorta, and organic tumours exterior to the lung.

Of those diseases, in which an increase of the quantity of air, and consequently an increase of the sound on percussion, are results, we have but two: namely, dilatation of the air-cells, and pneumothorax. It seems possible also, that an extremely anæmic state of the body, by diminishing the amount of the circulating fluid, may produce a morbidly clear sound on percussion, and that in this way we may explain the extraordinary clearness observed in many phthisical patients, even though the lung contains considerable quantities of scattered tubercle.

I shall now briefly recapitulate the principal thoracic affections, with reference to the result of percussion.

First. *Diseases causing a diminution in the sound on percussion.*

The different forms and stages of pneumonia, serous and sanguineous congestions, pulmonary apoplexy.

Tubercle, cancer, melanosis, hydatids.

Bronchitis in its first and second stages.

All liquid effusions into the pleura and pericardium.

Active and passive enlargements of the heart.

Aneurisms of the aorta or innominata.

Organic tumours of the mediastinum, pleuræ, pericardium, or heart.

Secondly. *Diseases causing an increase of the sound on percussion, either partial or general.*

Dilatation of the air-cells.

Hypertrophy of the lung.

Pneumothorax, with or without fistula.

Pneumopericardium.

Now, the great point, as connected with the applicability of percussion to diagnosis is, that these diminutions or augmentations of the quantity of air being almost always partial, give consequently partial phenomena. A circumstance admitting of the application of comparison, which, as we have said before, is so important in physical diagnosis.

For example, in the case of solidification of one lung, although, for the sake of argument, we may suppose that the quantity of air within the thorax is diminished by one-half; yet, it does not follow, that the sound on percussion of the whole thorax is proportionally lessened. For the healthy side retains its natural sound, or at all events gives a sound so little diminished as by no means to interfere with the comparison of the healthy with the diseased lung. Again, in a case of incipient phthisis, the upper lobe of the lung is tubercular; yet, this diminution of the quantity of air does not affect the sound of the lower portions; and hence, a comparison between them can be established, and the disease be thus detected. Further, in a case of pneumothorax, or of partial dilatation of the air-cells, the increase of sound is only partially observed, the healthy portions giving less resonance on percussion: so that here, also, comparison can be established. I am aware, that, reasoning upon strictly physical principles, we should expect some diminution or increase of sound in the healthy portions; yet, if this does occur, the alteration is so slight as not to interfere with the facility of diagnosis, unless in extreme cases of disease. It is plain, that if such alteration occur, it will interfere more with the comparison of the parts of the affected lung among one another, than to that of the diseased with the healthy lung.

LECTURE LVI.

ACTIVE AUSCULTATORY PHENOMENA — Sounds of respiration, of cough, of voice, and sounds of the heart and great vessels—Value of physical signs tested by comparison, on reference to feebleness and strength of respiration, the phenomena of voice, detection of foreign bodies in the bronchial tubes—Difficulty of diagnosis, of tubercle in deformed chest from previous disease—Combination of signs, particularly those drawn from percussion and the stethoscope—Signs considered with relation to time—Successive changes—Relation to symptoms —Insufficiency of mere physical diagnosis—Coexistence of morbid action in different tissues of the lungs; as of bronchitis and pleurisy with pneumonia—Illustration from tubercular consumption.—The three tissues—mucous, parenchymatous, and serous—are more or less affected in many acute, and in most of the chronic pulmonary diseases.

ACTIVE AUSCULTATORY PHENOMENA. — The principle of diagnosis, founded on these signs, is extremely simple. I may give the following explanation of this principle: —

The manner in which the stethoscope assists us in detecting the state of the thoracic viscera can be explained in a very few words. The air, as it passes through the lungs in the acts of inspiration

and expiration, the sound of the voice in different parts of the chest, and the impulse and sound of the heart at each pulsation, have all certain characters in the state of health. They present phenomena which are to be considered as standards of comparison. Now, every disease of the lungs and heart alters or modifies these characters, according as the case may be; and it is by the knowledge of the *morbid phenomena* or deviations from the natural state, that we may judge of the state of the thoracic viscera.

I need scarcely remark, that I do not maintain, that health implies an identity of phenomena in every individual; the signs in a child differ from those in an adult, those of the female from those of the male; and there are other cases of natural modification, but still, taking these circumstances into consideration, the active auscultatory phenomena of health have a sufficiently constant character to deserve the name of standards of comparison, and to be used as such.

The active auscultatory phenomena may be classed as follows:

I. Sounds of respiration:—
   Tracheal.
   Vesicular.
II. Sounds of cough.
III. Sounds of voice.
IV. Sounds of the heart and great vessels.

Now, the effect of disease is twofold: it modifies these phenomena, and it gives rise to new and non-analogous signs; so that we have active auscultatory phenomena of health, — next, modifications of these, produced by disease; and, lastly, entirely new active auscultatory signs, whose existence is solely the result of a diseased state: as, for instance, the different *râles;* the metallic phenomena; the rubbing sounds of the serous membranes; and the various murmurs of the heart and great vessels, &c.

Having now given a short sketch of the sources of physical diagnosis, I shall announce the great principles that govern their application to the detection of disease; these may be stated as follows:—

First. That the value of most of the preceding signs, or of their combinations, in the determination of the seat, nature, or extent of disease, is to be estimated more by comparison with the phenomena of other portions of the chest, than by their mere existence in a particular situation.

Second. That the greater the number of physical signs which can be combined in any particular case, the more accurate will our conclusions be. But of these combinations, the most important and indispensable is that of the passive and active auscultatory phenomena.

Third. That the existing physical signs are to be considered in relation to the period of duration of the disease, and the rapidity or slowness of their own changes.

Fourth. That in all cases, the value of physical signs must be

tested by the existing symptoms and previous history; while, on the other hand, the observation of these physical signs enables us to correct the conclusions to which we would be led by the unaided study of symptoms.

I shall first proceed to the elucidation of the principle of comparison. This principle, which may be said to be the basis of physical diagnosis, has not been sufficiently insisted on, either in the work of Laennec, or of any of the succeeding writers on auscultation. Indeed, Dr. Williams is the only author who alludes to the subject (*Rational Exposition of the Physical Signs of the Disease of the Lungs and Pleura*). But even this author does not sufficiently insist on its paramount importance, and refers to it principally as connected with the use of percussion. "A person commencing the practice of percussion, will be guided more safely by the comparative than by the absolute sounds of different parts of the chest; and although he should lose no opportunity of acquainting himself with the sounds, both of percussion and auscultation, in healthy subjects, he should, in case of disease, more particularly at first, direct his attention to irregularities or want of correspondence of the two sides in the same subject. In instituting this comparison, he should be careful, likewise, to practise percussion on corresponding parts of the two sides, and with such an attention to the manner in which his fingers fall, and, if he uses the digital pleximeter, the manner in which this is placed, that any difference of sound may not arise from these fortuitous circumstances."

But the principle of comparison must be applied to *all the means* of physical diagnosis, and must never be lost sight of, either by the tyro or the most practised investigator of disease; for, as will be shown, it is the only mode of avoiding error.

We have already seen how beautifully the anatomical structure of the thorax favours the application of this principle; the organs in this cavity being more remarkably and completely separated than those of the cranium or abdomen. From this circumstance two important consequences are derived: first, the facility of comparison of the different portions, and next, the circumscription of disease.

Let us now take some examples of the value of comparison. Feebleness of respiration occurs in many diseases of the lung. Now, suppose we are called to examine a patient with symptoms of incipient phthisis, we may find the vesicular murmur under the clavicle exceedingly feeble, a character of common occurrence in cases of tubercular disease; yet, if from this alone we were to conclude that the case was really phthisis, we might be altogether wrong, for many persons have a naturally feeble respiration over the whole chest. In such a case, the sign of feebleness of respiration under the clavicle might be of no value, for it would be only the natural character of the respiratory murmur. But suppose that, in another case, we found the same feebleness of respiration in the same place, and, not content with this superficial examina-

tion, we explored the opposite side, and found the respiration there unusually loud, then, indeed, the feebleness of respiration would become a sign of positive value; because, under such circumstances, experience tells us that, in most cases, it is actually produced by tubercular development. Thus, in this instance, the sign derives its whole value from comparison.

Let us now take the opposite case: there is a character of respiration termed puerile, from its resemblance to that of children, and which commonly occurs in cases where some other portion of the lung has been disorganised. But the mere circumstance of hearing puerile respiration in one portion of the lung, is by no means a conclusive proof of the existence of disease in some other part, for, in certain cases, the respiration is universally puerile, independent of any disease; it is only the coexistence of puerility in one portion, and feebleness in another, that gives any value to the sign; in other words, it is by the test of comparison that its value must be estimated.

The same observations apply to the phenomena of the voice. An increased resonance of the voice is a common sign of solidity of the lung, but one of no value, except by comparison, for many persons present a natural bronchophony over a large portion of both lungs. But, where the resonance is loud and distinct in one lung, and either wanting, or much less intense, in the corresponding portion of the opposite one, it then becomes a sign of decided value. I might also extend this to the sign of pectoriloquism, about which such a quantity of error is extant. Some persons are naturally pectoriloquous in the upper portions of the lungs; and it is plain that, in such cases, the discovery of the phenomenon under the clavicle, or over the shoulder of one side, might lead to great error unless tested by comparison.

The following is an important and common illustration of the value of comparison. A patient presents the symptoms of cough, muco-purulent expectoration, accelerated breathing and pulse, emaciation, and hectic. Under these circumstances, we detect a mucous rattle in the subclavicular region; a sign which, when properly estimated and corrected, may lead to an almost positive diagnosis of phthisis, with softening of the tubercles. Now, if, in a patient labouring under the above symptoms, we were to conclude, from the mere existence of this sign in this situation, that the case was really phthisis, we might fall into error, for a comparative examination of the different portions of the chest might show that the *râle* was universal; a discovery which would greatly diminish its value as a sign of phthisis, and leave a probability that the case was one of bronchitis, with copious effusion into the smaller tubes. In such a case, the value of comparison is obvious.

On the other hand, the existence of *râle*, either under one or both clavicles, while the inferior portions remained free, would, when occurring with the symptoms described, be a most important diagnostic of phthisis.

Comparison must be used in determining the value of the modifications of the original active phenomena, as well as that of the new or non-analogous signs. A good example of this is seen in the detection of foreign bodies in the bronchial tubes; for it is principally by the comparison of the respiratory sounds in both lungs, that the diagnosis of a foreign body can be arrived at. I may also observe that, in certain cases of aneurism of the aorta or innominata, it is by a comparison of the respiratory murmur, in either lung, that the existence of the tumour at an early period can be detected.

We get a good idea of the value of comparison by reflecting that the cases in which diagnosis is most difficult are those in which the phenomena are the same over the entire chest. There are two cases of phthisis in which physical diagnosis is extremely difficult; the one an acute, the other a chronic case; yet, in both of which, the tubercle is equally and universally developed in both lungs, and, consequently, similar phenomena being given by all parts of the chest, the diagnosis, by comparison founded on the localisation of disease, becomes inapplicable. The same remarks apply to the case of double empyema, in which we lose the advantages that the comparison of the differences between the physical phenomena of either side gives us in single pleurisy; and also to that of double and equal dilatation of the air-cells, the detection of which must depend on the direct signs, and history of the case.

One of the most striking instances of the difficulties which arise when the application of comparison is fallacious, is that of the development of tubercle in a patient whose chest has been deformed from previous disease. Patients who have recovered from empyema with a contracted side, are liable to tubercular development, and the stethoscopist may be called to determine the question as to whether tubercle exist or not. I have been more than once in this situation, and believe that a more difficult case for diagnosis can hardly be met with. The symptoms will seldom afford any assistance, as they may proceed either from incipient phthisis, or be those commonly present during the convalescence from empyema. And, in consequence of the previous disease of one pleura, and the contraction of the chest, we are deprived of the advantages of comparison of the phenomena of both lungs, by the stethoscope and percussion. Thus, if we find the side originally affected to be duller than the other on percussion, this may be explained either by the diminished volume of the lung, or by the development of tubercles. The same difficulty exists in the observation of respiration, and the phenomena of the voice. But if the opposite lung be the seat of tuberculous disease, we may detect the affection in its early periods; yet, in a remarkable case that I lately saw, and in which, after a comparatively rapid recovery from empyema of the left side, tuberculous disease set in; all the stethoscopic signs indicated disease in the left lung, and not in the right; and yet, on dissection, the right lung was found full of miliary and granular

tubercles, while the left contained scarcely any. Of this, the preceding considerations afford an easy explanation. The left lung was dull on percussion, from its diminished volume; for the same reason its vesicular murmur was feeble, while, in the right, the disease had not become sufficiently extensive to cause a greater dulness, or even an equality of sound. It is plain that, under these circumstances, a greater amount of disease in the right lung would be required to lead to its detection than in a case where the opposite lung had not been previously affected by empyema.

Independent of the importance of the principle of comparison, its practice in all cases is of the greatest utility, by leading to the discovery of lesions which would otherwise escape us. I remember being called to see a patient, who had received an injury of the side, and who was labouring under fever, cough, expectoration, and dyspnœa. His attendants had examined him repeatedly with the stethoscope, and discovered nothing but bronchitis. I had him stripped, and found the phenomena of empyema and pneumothorax in the lower part of the right lung; his attendants had examined the upper part of the chest carefully, but had neglected the lower, and thus the true nature of the disease had escaped them.

With respect to the heart, it is evident that the diagnosis, by comparison of signs with one another, is not so applicable as in the lungs. We are forced, in many cases, to depend upon the characters of isolated phenomena; and hence the difficulty which attends the detection of diseases of the heart may be in part explained. If we consider the heart as a single organ, it is plain that we have no standard for comparison, and the same observation applies if we take it as a double organ; for the arterial and pulmonary hearts have original differences, whether anatomically or physiologically considered.

Yet, comparison is not wholly inapplicable in cases of diseases of the heart. By it, we may often determine the seat of disease, if not its nature; we also find it applicable in the diagnosis of certain cases of aneurism of the great vessels.

We now proceed to consider the next principle of physical diagnosis; namely, the combination of signs, and, in particular, those drawn from percussion and the stethoscope.

For example: a patient is affected with stridulous breathing, and by percussion we discover that one clavicle is decidedly dull. This proves that there is in that situation a diminution of the normal quantity of air — a condition generally produced by either pulmonary solidity, or by displacement of the lung from an aneurismal tumour. Here, to determine the important question as to whether the case be disease of the lung or aneurism, the employment of the stethoscope becomes absolutely necessary. We must correct the passive by the active signs.

Again: suppose that we detect feeble respiration in any portion of the lung, we have a character which may be produced by essen-

tially opposite states of the pulmonary tissue; in other words, by an increased or a diminished quantity of air. Percussion must be used to correct the stethoscopic observation. The active signs are to be corrected by the passive.

A patient has presented, for some time, decided dulness of the upper portion of one lung, and we find, subsequently, that this portion regains its sound. Now, this circumstance may be produced either by the formation of a cavity, or by the return of the lung to its healthy state. Here the observation of the active signs is necessary to determine the value of the passive.

A patient has presented the sign of friction, or the rubbing sound produced by the inflamed state of the serous membrane; and, after a time, this active phenomenon is observed to disappear, which may result either from the cure of the disease, or the separation of the layers of the pleura or pericardium, by a liquid effusion. To determine the point, we must have recourse to the observation of the passive phenomena. If it be the former case, percussion will give a clear, if the latter, a dull sound.

In the case of a foreign body in the trachea, or the pressure of an aneurismal tumour on one bronchus, we may observe either complete absence or great diminution of the respiratory murmur in either lung. This modification of the active auscultatory phenomena, for its value in the diagnosis of aneurism, depends entirely on the result of percussion, as we shall see hereafter.

It is only by the combination of these two classes of signs, that we are able to arrive at the diagnosis of a rare, but most important disease, namely, acute general development of tubercles, with bronchial irritation. In many of these cases, stethoscopic observation can only detect intense bronchitis; and, without the aid of percussion, no other diagnosis could be arrived at. Now, acute bronchitis may exist with apparent clearness of sound; but if, in such a case, we observe an increasing and decided dulness of the chest, the diagnosis of a general development of tubercle may be often safely arrived at.

Many more instances, illustrative of the necessity of this and other combinations, might be given. I may, however, add one more common example. A patient has been attacked with symptoms of inflammation of the lung, and at an advanced period we find the affected side completely dull on percussion. This may arise either from a pleural effusion or a solidification of the lung, and the observation of the active phenomena will be necessary to determine the question.

Thus, the passive and active auscultatory signs mutually correct each other; yet even their combination with all other classes of signs will be insufficient, if the history and symptoms of the case be not accurately considered and compared with them. In other words, it is not enough to compare one set of signs with another, but all the signs, whether acoustic or not, with the history and symptoms.

Let us next consider the physical signs in reference to the

duration of the disease, and the rapidity or slowness of their own changes.

A patient, previously healthy, is attacked with inflammatory symptoms and pain in the side. Now if, in the course of twenty-four hours, we find the affected side dull on percussion, a strong probability exists that the case is one of effusion into the pleura, rather than hepatisation of the lung. Let us, on the other hand, suppose that the symptoms have continued for a week or ten days, and that, at the end of that time, we find the sound clear on percussion, then, at all events, we may conclude, that the case is not pleurisy with effusion, or hepatisation of the lung. It may be dry pleuritis, pleurodyne, or bronchitis.

We discover the signs of a cavity in any portion of the chest. Now, the determination of the nature of that cavity will depend much on the history of the patient. If he has been in good health, and free from pulmonary symptoms, up to within a week or fortnight of the time when we have first examined him, the great probability is, that the cavity is not tuberculous. It may be a pneumonic or a gangrenous abscess. On the other hand, if the case has been chronic, in the ordinary acceptation of the word, the chances are, that the cavity is tuberculous.

Let us suppose that we discover an extensive gurgling over the upper portion of one side, and that the question arises, as to whether this is caused by an anfractuous phthisical cavity, or by dilated tubes. Here, along with other sources, the period of the continuance of the symptoms is a most important element in settling the question. If the patient has had similar symptoms for five, ten, or fifteen years, the chances are, that the case is one of dilated tubes; but if his symptoms have continued only for three or six months, then it would be almost certain that the signs proceeded from a multilocular phthisical abscess.

It would be easy to show, that many other diagnosis are founded on the connection of the actually existing physical signs with reference to the period of continuance of symptoms. I may enumerate a few of these: —

Foreign bodies in the trachea.

Acute general development of tubercle.

Laennec's emphysema of the lung.

Certain cases of empyema and pneumothorax.

Hydrothorax.

Nervous palpitation of the heart, as distinguished from organic disease.

Pericarditis with effusion.

Rupture of an hepatic abscess into the lung.

Sympathetic cough. — This example, perhaps, requires some explanation. We may find, in a case where violent cough has existed, either that there is no physical sign of disease, active or passive; or that, if there be, the signs are insufficient to account

for the symptoms. Now, these circumstances may arise either from incipient organic disease, or from mere functional lesion. If the symptoms have continued for a considerable length of time, the great probabilities are, that the case is one of original, or symptomatic neurosis of the lung.

The above instances are sufficient to show the application of the principle of combination of the history of the case, *quoad* the period of duration of symptoms, with the actually existing physical signs. But we must go farther, and consider these signs with reference to the rapidity and slowness of their own changes. Perhaps the most interesting source of physical diagnosis is drawn from considering the signs, with reference to their permanence for certain periods, and the mode and order of their successive manifestations. One of the best examples of this is seen in the case of dilated tubes. It may be often difficult to pronounce whether the signs of an excavation proceed from a phthisical cavity, or from dilated tubes. Now, as a general rule, it may be stated, that the extension of the cavity is much more rapid in the former than in the latter case; and from this we derive the following rule; that if, in any instance, we can recognise a rapid extension of a cavity, the case is not one of dilated tubes. If, in the course of a fortnight, or a month, the stethoscope indicates a decided increase in the size of the excavation, we recognise an ulcerative extension, rather than that almost imperceptibly slow process by which the bronchial tubes become dilated so as to simulate abscess of the lung.

Again, we may experience difficulty in determining whether a patient labours under an enlargement and valvular disease of the heart, or an aneurism of the ascending aorta. I have seen several of such cases, in which I at first suspected an aneurism; as much, if not more, from the history and symptoms as from the signs; but in which my suspicions were converted into certainty, from observing that the extension of the signs of dulness, pulsation, and the accompanying murmurs occurred much too rapidly to permit the supposition that they proceeded from a further enlargement of the heart itself.

In the case of a foreign body lodging in the right bronchus, we have another excellent example of this source of diagnosis: the sudden suspensions and reappearances of the respiratory murmur in the affected lung, while the sound on percussion remains clear, point out sudden alterations of the conditions of permeability and impermeability in the corresponding bronchus. And it is scarcely necessary to observe, that these are circumstances only explicable on the supposition of a moveable foreign body existing in the tube. Indeed, in the mode of succession of the various signs in the different thoracic diseases, we have a source of diagnosis of such importance, that it seems not impossible but that future investigation will show that it is in this department we are to seek for the perfection of physical diagnosis. For in many instances we find, that in different

diseases the characters of the signs are identical, but their modes of succession are constantly and characteristically different.

For example, œdema of the lung presents a crepitating *râle*, often undistinguishable from that of pneumonia, as far as its physical characters are concerned; but successive observations may determine the point. In œdema, the dropsy of the lung causes no further organic change, and the crepitus consequently persists, with little or no change, for a length of time, the sound on percussion remaining the same. On the other hand, there exists in pneumonia a cause which produces successive and important modifications in the structure of the lung; and, accordingly, we find corresponding changes in the physical signs. The crepitating *râle* by degrees masks the vesicular murmur, and, as the congestion advances, gradually disappears, until impermeability of the cells and finer tubes is produced. We have then dulness of sound and bronchial respiration. But the changes do not stop here, for the lung may pass into suppuration, or return to health; in either of which cases, important changes in physical signs take place.

In these successive changes, then, is founded the physical diagnosis between pneumonia and œdema. I may here remark, as illustrative of the importance of studying the mode of succession of signs, that although there is no single sign in pneumonia which is pathognomonic, the possibility existing of every one of them arising from other causes; yet we know of no other disease which presents, in its progress or resolution, the same mode of succession of phenomena. I have already stated, that no possible combination of signs can be considered as absolutely pathognomonic. The observations just now made are by no means contradictory of this, as they apply not to any existing combination, but to the successive developments of physical phenomena.

I might adduce many other instances of this mode of investigation, but enough has been stated to explain the principles. The preceding observations strongly illustrate one of the most important principles connected with the science of thoracic disease, namely, that it is not enough to be able to recognise, nicely distinguish, and remember signs, but that we must know how to reason upon them. Here we see the fusion of the mechanical and the pathological parts of the science, learn their mutual dependence, and find why it is that the mere auscultator, or the mere symptomatologist, can never excel in the diagnosis of diseases of the chest.

I shall now, in conclusion, briefly allude to the absolute necessity of studying the symptoms in relation to the physical signs.

It is true that the mere observation of certain physical signs may, under particular circumstances, lead us to conclusions probably correct, but the object of medicine is certainty. The existence of gurgling and cavernous respiration under the clavicle, tells of a cavity communicating with the bronchial tubes, and containing air and liquid; in other words, of an abnormal physical change: so far

we have certainty. For the relative frequency of its causes, we might say that the cavity was probably phthisical, but the possibility would exist of its being a dilated tube, a pneumonic, or a gangrenous abscess.

Again, the occurrence of metallic tinkling, and amphoric resonance, points out the presence of a vast cavity communicating with the bronchial tubes, and containing air and liquid; and in like manner, from the comparative frequency of its cause, we might conclude that the case was probably an example of empyema, pneumothorax, and fistula; but on the other hand, these phenomena may occur from an essentially different pathological condition of the lung; nay, further, we shall find, that some of the metallic phenomena may arise from sources altogether external to the thorax.

Let us take a few more examples, illustrative of the insufficiency of mere physical diagnosis. It is commonly held by those who are but partially acquainted with auscultation, that the crepitating *râle* is a sign of pneumonia; that it is so is true, but in some of its forms it may occur in other affections. Let us suppose that we are called to a patient whom we have never before seen, and, with the history of whose case, or his present symptoms, we are ignorant, and that on applying the stethoscope to the postero-inferior portion of the right lung, we discover a crepitating *râle*, we have then a phenomenon which may be produced by many essentially different causes; and were we to make the diagnosis of pneumonia, our opinion would rank nothing better than a mere guess. Among its various causes, the phenomenon might be produced by the following: acute pneumonia in the first, the suppurative, or the resolutive stage; chronic pneumonia, congestion, œdema, mucous catarrh, tubercle, hepatic abscess opening into the lung, pulmonary apoplexy. Now, supposing that these were all the possible causes of the phenomenon, and that their occurrence was of equal frequency, and that, without an accurate investigation into the history and symptoms of the case, we concluded that its cause was an acute pneumonia in the first stage, there would be nine chances to one against our guessing right. But if this crepitating *râle* was observed in a patient who had been but twenty-four or forty-eight hours ill, and had previously no symptoms of pulmonary disease; if he had inflammatory fever, pain of the side, cough, acceleration of breathing, and viscid expectoration, we might safely conclude that its cause was an acute pneumonia in the early stage. Again, if it occurred in a patient who had been attacked some days before with the constitutional symptoms of pneumonia, which had subsided after judicious treatment, and in whom there had been pain of the side which had disappeared; bloody and viscid expectoration, which had been succeeded by a clear or concocted mucus; dulness of sound and bronchial respiration, which had subsided or was diminishing; we might safely conclude, that the *râle* was an example of Laennec's crepitus of resolution. Lastly, if it occurred

in a patient in the advanced stages of pneumonia, in whom the powers of life were sinking, who had the prune-juice sputa, or was expectorating a yellow purulent matter, and in whom the affected portion of the chest sounded absolutely dull and with distinct bronchial respiration, we might safely declare that the lung was in the third or suppurative stage. It is true, that differences in the character of the sign in these different stages may exist, and be appreciable; but my experience leads me to the firm belief, that in testing the value of any sign we are to look more to the history of the case, and the accompanying physical and vital phenomena, than to its absolute character. Here, I am anxious not to be understood as depreciating the importance of studying the actual characters of physical signs. On the contrary, I am convinced that the more the ear is accustomed to appreciate minute differences of sound, the greater will be our accuracy in detecting the nature of disease. But while I do not deny the possibility of training the sense of hearing to such a pitch of accuracy as that from the character of sounds we may yet, in certain cases, infer the vital cause of phenomena, I feel that this perfection is not easily attainable, and, at best, can be enjoyed only by the few. And it must never be forgotten, that disease occurs under infinitely numerous modifications, so that the result being the same, the physical phenomena may not be absolutely similar.

Again, we meet, under the same circumstances, a patient with feebleness of respiration, and dull sound on percussion in the same situation: this may depend on inflammatory, tubercular, or cancerous solidification of the lung, pulmonary apoplexy, empyema, hydrothorax, contraction of the chest from a former attack of pleuritis, enlargement of the liver, pushing up the diaphragm, ascites, and aneurism of the aorta. Here the same observations as in the former case evidently apply.

The same train of argument is applicable to most of the other classes of physical signs, as will be abundantly shown when I come to speak of the diseases in particular.

It has been objected to the advocates for the stethoscope, that they discard the consideration of symptoms, and that, throwing overboard all the knowledge we possessed previously to the introduction of auscultation, they pretend to ascertain the existence of all diseases of the chest by the sole observation of physical signs. There is only one answer to be made to this objection — namely, that it is wholly groundless; indeed, those who make it only betray their ignorance of the subject. Laennec never taught that auscultation could supersede the mode of examination by symptoms; on the contrary, he devotes a considerable portion of his work to their history and analysis, and, in many places, especially insists on the necessity of their careful study. He gives instances where the physical signs having been accurately observed, the history and symptoms of the case were alone to determine the nature of the disease: thus, in describing a case of dilatation of the bronchial

tubes, he states that the physical signs allowed of two suppositions — either that of an extensive dilatation of the bronchial tubes, or of a multilocular phthisical excavation ; — " I determined, however, on the first diagnosis," says Laennec, " from the general state of the patient and the history of the disease." Andral, who is the second writer on auscultation, devotes a large portion of his work to the examination of symptoms ; so do Louis, Bertin, Forbes, Duncan, Elliotson, Hope, Williams, and all other writers of any authority on the subject.

It is true, that combinations of physical phenomena may sometimes arise, which would lead to a great degree of probability, indeed almost a certainty in diagnosis. A patient with a dilated side, giving morbid clearness on percussion, with the sound of fluctuation on succession, and in whom also the stethoscope detected the metallic tinkling, &c., might be said, with almost positive certainty, to labour under empyema, pneumothorax, and pulmonary fistula ; but such cases, or those analogous to them, are comparatively rare ; and, even in the case in question, the cause of the fistula would be undetermined. In the cases we are every day called to treat, the *value of physical signs must be tested by the history and symptoms, and these in their turn must be corrected by the physical signs.* Whoever neglects either source or information will fall into the most fatal errors. We must have recourse to the assistance of each and every one of these means ; and even still, with all this combined knowledge, we shall meet with cases, the real nature of which is involved in the greatest obscurity. Indeed, when we reflect on the infinite complications of disease, modified by circumstances infinitely numerous, it would be strange if such did not arise ; and there can be no doubt, that if our means of diagnosis were extended one hundredfold beyond their present state, the same circumstances would still occur. Physical signs form an addition, constitute an assistance to diagnosis, but nothing more ; yet of their value every impartial mind must be convinced, who compares the state of our knowledge previous and subsequent to their discovery. It is on the discovery, explanation, and connection of these signs with organic changes, and with the symptoms and history of the case, that Laennec's imperishable fame is founded. Time has shown that his principles of diagnosis were not the bagatelle of a day, or the brain-born fancy of an enthusiast, the use of which, like the universal medicine, was to be soon forgotten, or remembered only to be ridiculed ; it has shown that the introduction of auscultation, and its subsidiary physical signs, has been one of the greatest boons ever conferred by the genius of man on the world. A new era in medicine has been marked by a new science, depending on the immutable laws of physical phenomena, and, like other discoveries, founded on such a basis, simple in its application and easily understood. A gift of science to a favoured son : not, as was formerly supposed, a means of merely forming a useless diagnosis in incurable disease, but one by which the ear is

converted into the eye; the hidden recesses of visceral disease opened to the view; a new guide in the treatment, and a new help in the early detection, prevention, and cure, of the most widely spread diseases which afflict mankind.

In conclusion, I would refer to one of the most essential points as bearing on the diagnosis of chest disease — namely, the coexistence of morbid action in the different tissues or structures of the lung. In a practical point of view, the lung may be considered as consisting of three different parts or tissues. We have, in the first place, an extensive mucous expansion, forming the internal or lining membrane of the lung, and which may be described as commencing at the rima glottidis and terminating in the air-cells. We have next these air-cells, and their connecting cellular tissue, forming, with their bloodvessels, what is called the parenchyma of the lung; and, lastly, we have its external serous covering, the pleura.

From this division authors have arranged pulmonary affections into those of the mucous membrane, those which involve the air-cells and intervesicular cellular tissue, and, lastly, those affecting the serous covering. Under the first, they class the different varieties of laryngeal, tracheal, and bronchial disease; under the second, such affections as pneumonia, tubercle, pulmonary apoplexy, &c., &c.; and under the third, we have the different forms of pleuritic inflammations, and the various effusions into the cavity of the pleura.

This division, though convenient in the writing of systems, and to a certain degree applicable in the practice of medicine, is found to fail when we accurately consider the symptoms and pathology of thoracic disease. In many cases, indeed, do we find it impossible to draw the line of distinction between the affections of these different elements, for not unfrequently the diseased action extends more or less to them all. We have bronchitis combined with pneumonia, pneumonia complicated with pleuritis, and very frequently the three lesions coexist: an observation which applies both to the acute and the chronic diseases of the lung. In the treatment of pulmonary affections it is of the utmost importance to bear this principle always in view.

For example, in almost every instance of acute pneumonia there is bronchitis also, a circumstance never to be forgotten in the treatment and progress of the case. For in many instances, after the relief of the pneumonia, properly so called, we have to contend with an extensive and severe bronchial inflammation, which, if unrelieved, may cause the death of the patient. And the importance of this is further shown, if we recollect that the mode of treatment of the two cases is not the same, and the source of danger and the effects on the economy totally different.

But the complication with bronchitis is not the only one to which such a case is subject — for disease of the pleura is perhaps as frequent, from whence the term pleuro-pneumonia, one applicable to the great majority of cases. It is true, that the pleuritic inflamma-

tion is generally of the dry kind, and hence of less importance; but the reverse may occur, and a purulent effusion, or a serous collection, form in the cavities of the pleura; so that in certain cases the practitioner, ignorant of these facts, might suppose that he was contending with hepatisation of the lung, when in truth his patient was labouring under empyema or hydrothorax.

Again, let us consider the ordinary case of tubercular consumption. Were we to confine our ideas of this affection to the mere growth and suppuration of tubercles, we would have indeed a most limited and erroneous view of the disease. For in this affection we have not only tubercle in every stage and form, but also the extension of disease to all the tissues of the lung. Many varieties of pneumonia may occur—and the disease in the abstract is a common complication, producing the most important modifications in the symptoms and progress of the case. If we consider the mucous membrane, we shall find the same remarks to apply; many cases appear to commence by bronchitis, and in their progress the state of the mucous membranes comes to be of the utmost importance. Every form of disease may, and commonly does occur, and bronchial secretion is frequently the chief source of the wasting expectoration.

If we now examine the serous membrane, we find evidence of extensive disease. In the great majority of cases, adhesions — sometimes so complete as to obliterate the whole sac — thickenings, effusions, or even ulceration with a fistulous communication passing inwards, are common occurrences. This frequent complication of pleuritis in consumption, as we shall find hereafter, may be considered as a great good, for, in many cases, it may be looked on as one of the processes of nature towards bringing about a cure.

It may be laid down as a general principle, that in many acute, and in almost all chronic affections of the lung, we find these three tissues more or less engaged. In one case the disease predominates in the bronchial mucous membrane; in another, in the parenchyma; in a third, in the pleura; yet still the principle will be found very generally true, and its practical application is sufficiently obvious. But as, in the present state of our pathological knowledge, we must admit that cases are to be met with in which disease seems to be confined to a single tissue — and further, that, even in the complicated cases, disease may be traced as commencing in one tissue and then extending to another — it becomes convenient to study the affections separately; and experience shows that the principles of treatment should vary according to the isolation or predominance of irritation in any of these three essential elements.

Now, the knowledge of these facts is of the utmost importance to the student of physical diagnosis, and will remove many difficulties which must otherwise occur in the course of his investigations. Thus, in a case of bronchitis, he will be prepared to meet with dulness of sound on percussion, resulting from an accompanying congestion of the vesicular structure, or the sound of

frottement from the deposition of lymph on the pleura, or even ægophony from a slight liquid effusion. Nor will he be surprised or puzzled, if, in a similar case, the signs of a pneumonia or a hydrothorax should supervene. In a case of partial pneumonia, the existence of a sonorous or sonoro-mucous rattle in the other portions of the lung will not embarrass him. He gives to the first case the denomination of bronchitis, because he finds that irritation predominates in the mucous membrane; and although there may be signs of sanguineous congestion, or even of pleurisy, yet these seem of comparatively little importance, and their treatment may often be merged in that of the prominent inflammation. On the other hand, these may become sources of danger, and for this he is prepared. So also in the case of pneumonia — the extent and character of its proper signs enable him to recognise the disease, even although more or less of bronchitis or pleurisy may coexist. The same observations will apply to the diseases of empyema and phthisis; in the first of which the signs of bronchitis so commonly occur, and in the second, where there is scarcely a physical sign of pulmonary disease that may not arise.

LECTURE LVII.

DR. BELL.

Division of diseases of pulmonary organs.—Erythematic Laryngitis—General mildness of the disease and simplicity of its treatment—Catarrhal Laryngitis—chiefly dangerous in infants—Its treatment—Acute Œdematous or Sub-mucous Laryngitis—A most formidable disease—Its symptoms—Respiration and deglutition both affected; and afterwards the cerebral functions—Duration—Œdema of the glottis not a separate disease—Two varieties of acute laryngitis established by Cruveilhier—Is not of frequent occurrence—Treatment actively and speedily antiphlogistic—Venesection—General Washington's case—Leeches to the throat, or cups to the nucha—Blisters—Tartar emetic with small doses of opium—Calomel and opium—Early recourse to laryngotomy—Mortality from active laryngitis.

I shall follow the division of the diseases of the pulmonary organs laid down by Andral, viz., into, 1, those which are seated in and primarily and chiefly affect the air-passages; and 2, those of the vascular and parenchymatous structure in which hematosis takes place.

In the first section we have the diseases of the larynx, both acute and chronic; which, again, may be inflammatory or nervous; and, if the former, may be accompanied by an erythema or a tumefaction of the mucous membrane of the part, or by the secretion of mucus or of pus, or the formation of false membranes.

Simple erythematic laryngitis is the mildest of all the forms of inflammations of this organ. Its causes are external and internal. The former are sudden variations of temperature; breathing air in

which irritating molecules are suspended; throwing open the neck, which had been habitually covered, to a cold air. Of the internal causes we find enumerated fatigue of the larynx in protracted and loud singing and speaking. Sometimes it supervenes on the diseases of other organs, and by simple continuity of tissue, as we see in inflammation of the pharynx or of the bronchia, or sympathy as in gastro-enteritis. It is sympathetic, as in measles, in which the same inflammatory congestion is present in the conjunctiva and the bronchia. It also shows itself in small-pox and in erysipelas.

Erythematic laryngitis is sometimes preceded by a feeling of general discomfort; sometimes by fever: and again it makes its attack suddenly, and manifests itself by a pain in the larynx, which may be slight, or of a more acute nature, augmented when the patient speaks or coughs, or when the larynx is pressed on. The voice looses its force, is changed in character, and hoarse. Deglutition is painful, and the cough is harassing by its frequency and dryness. After a while some mucus tinged with blood, and more frequently opaque, is excreted. When the inflammation is slight, it is not accompanied by any notable symptom; but when it is intense, the *innervation may be so profoundly disturbed as to mask the evidences of the local disease.* This last is an occurrence common in nearly all the anginose affections, and should be borne in mind by the physician when he is called upon for his prognosis. The patient when questioned will often reply that he feels no pain: he is disinclined to speak, and dozes much.

The treatment of the milder cases of this form of laryngitis is very simple; consisting in tepid mucilaginous drinks, a mild purge, followed by warm pediluvium. But if the inflammation be more acute, blood should be drawn from the arm; and if relief does not soon follow, leeches must be applied to each side of the larynx, from opposite the os hyoideus to the thyroid cartilage. There will be risk of the inflammatory afflux being increased, unless the leeches are in sufficient number to act decidedly on the injected mucous membrane, by the abstraction, from its minute and capillary vessels, of a sufficient quantity of blood. Mild counter-irritation will follow, if necessary, and a mercurial purge. Sometimes, though rarely, this disease may be converted into bronchitis, or into another kind of laryngitis, or become chronic, and give rise to laryngeal phthisis: hence, though it is never to be neglected, it demands more especial attention in those who have had laryngitis before in any form, or who are predisposed to phthisis. The expression —'it is only a slight cold or sore throat,' is a foolish, and has been often a destructive remark, by lulling suspicion of danger, and preventing the requisite remedial means from being adapted.

Catarrhal laryngitis, little different from the preceding, is caused more directly by atmospherical changes, sometimes of an epidemic nature, and suppressed perspiration. Its treatment is the same as that of the erythematic variety, with the difference that more benefit is obtained by the administration of an emetic. This

remedy is the more necessary in the catarrhal laryngitis of infants who are unable to throw off the accumulated mucosities in the windpipe, and are in imminent danger of suffocation in consequence. Here is an instance of the importance of removing an effect which may be more perilous than the cause, or inflammation of the mucous membrane itself. Derivation by purgatives is also advisable in this case; and if the principle be admitted, we should select those which most excite to increased secretion the mucous follicles of the intestinal canal. Calomel, therefore, with aloes or rhubarb, will be preferable to the saline purgatives, which often excite excessively without their exerting a good effect on the laryngeal disease. The common cough mixtures are of very doubtful efficacy in laryngitis, since they contribute to increase the secretion of mucus without a corresponding augmentation of ability to throw it off. Free expectoration, by which the bronchia are cleared, will not suffice for the laryngeal tube without additional efforts of a voluntary nature, which children cannot make, or rather will not, because they do not understand the necessity and use of the measure. Counter-irritation, by stimulating liniment rubbed on the neck, or even a small blister over the part, is at times called for, in cases of continued and excessive secretion of mucus in the larynx.

Acute Œdematous or Sub-mucous Laryngitis. — A more formidable variety of laryngitis is that called *œdematous*, which should be regarded as an aggravated degree of the erythematic. *Œdematous* ought not in propriety to designate this more violent stage of inflammation of the larynx — the effusion in the sub-mucous cellular tissue being only an effect of the inflammation. Acute laryngitis in this degree is one of the most alarming and intractable diseases which we are called upon to combat. It is more frequent in adults than in children. Sometimes it begins with the symptoms of cynanche tonsillaris. Soon, however, its diagnosis is rendered evident by difficult and even laborious inspiration, accompanied with stridor and hissing sounds, whilst the expiration is free; pain and feeling of constriction at the larynx, greatly increased by pressure on the thyroid cartilage, flushed face, lustrous eye, great thirst, full and frequent pulse. The cough is very troublesome, harsh and more stridulous than in croup, and accompanied by constant and voluntary hawking, as if to clear the passage by expectoration. The voice, at first acute and piping, gradually becomes thick, then hoarse and whispering, and at last is completely suppressed. There is sometimes great difficulty in swallowing, owing to the epiglottis ceasing to perform its valvular office; whence it happens that, when the patient begins to drink, a portion of the fluid escapes into the larynx, and produces a fit of coughing, which seems to threaten instant suffocation. The pain from ineffectual trials to drink produces in some a real hydrophobia; the sight of the fluid recalling so vividly former sufferings. An examination of the fauces shows them, in most instances, to be inflamed, and very often, by pressing

the tongue as much as possible downwards and forwards, the epiglottis can be seen erect, thickened, and of a deep red colour.

Laborious respiration and an inadequate supply of air affect the appearance of the patient, as manifested in his pallid countenance, anxious expression, livid lips, protruding and watery eyes; pulse quick, feeble, and irregular; with a colder surface of the body. The patient is restless and apprehensive; he seldom sleeps for many minutes at a time: when he begins to doze, he starts up in a state of the utmost agitation gasping for breath, every muscle being brought into action which can assist respiration, now a convulsive struggle. He is quite enfeebled, becomes delirious, drowsy, at last comatose, the circulation being more and more languid; and he dies on the fourth or fifth. day of the disease, or even earlier. Instances, says Dr. Cheyne, (*Cyclopædia of Practical Medicine*,) have come to our knowledge, in which the disease has terminated fatally within twelve hours (one of Dr. Armstrong's patients died in eight hours and another in seven); and, therefore, continues Dr. C., if a person dies suddenly in the night, who had complained on the foregoing day of sore throat, laryngitis may be suspected as the cause of death. Contrasted with these are other cases in which the disease has lasted three or four weeks.

By some an œdema of the glottis has been regarded as a different disease from that now under consideration; but without good cause. The term is misleading: it ought to be *œdema rimæ glottidis.* The only difference between this and the acute sub-mucous laryngitis just described, is in the extent to which the cellular tissue is inflamed. Sometimes there is simple effusion; at other times pus is met with. Cruveilhier (*Dictionnaire de Medecine et de Chirurgie Pratiques*) makes a division of laryngitis into *super*-glotteal and *sub*-glotteal. The former coincides more with that form described above, and depends on the anatomical lesions in the mucous folds which extend from the epiglottis to the arytenoid cartilages, (aryteno-epiglotteal ligaments,) and which become by inflammation so enlarged and tumid as to be felt by the finger on examination. The epiglottis itself is sometimes the chief seat of the lesions observed. The sub-glotteal variety consists also in an inflammation of the cellular tissue, but of that portion below the *rima,* and extending to the cricoid cartilage, which is necrosed. The symptoms are the same as those of the first variety, except that they are somewhat less violent; as owing to the greater density of the cellular tissue below the folds of the glottis, there is less infiltration than when these latter are inflamed. Hence, also, the disease is not so speedily fatal in the sub-glotteal variety, which we should, therefore, regard as that with which those persons are affected, who, as has been already stated, have lived for weeks under an attack of acute œdematous laryngitis.

The causes of acute laryngitis are not very obvious. Sometimes they are atmospherical vicissitudes. At times the disease super-

venes on convalescence from fevers, and, again, on chronic laryngitis. It has been observed in connection with erysipelas.

Happily this formidable disease is not of frequent occurrence. I have already said that it is confined almost entirely to adults; there being very few cases on record in which it has attacked children, or persons under the age of twenty. Authors describe, among the accompanying phenomena, in some cases, swelling of the integuments which surround the larynx, especially on the forepart of the neck. I have had one case of this kind under charge, in which the tumefaction was so rapid that it could hardly be exaggeration to say that its progress was almost visible. The subject was a child between two and three years of age. Venesection and purging seemed to have little effect in controlling the disease, which was obviously arrested, however, by leeches applied to the neck. Calomel was given at the same time, and seemed to be useful in completing the cure.

But I am anticipating what is to be said on the treatment of acute œdematous laryngitis. The weight of experience is in favour of free bloodletting, which, to be serviceable, must be early resorted to. At the same time, it must be admitted that we cannot hope by this means to remove the œdema and the consequent obstruction to respiration, which constitutes so much of the character as well as gives danger to the disease. But if the physician should be fortunate enough to be present at its inception, and aware of its symptoms, he may, by the use of the lancet, arrest the inflammatory action which causes the œdema; or if the first critical period have passed, the farther swelling may still be prevented and absorption facilitated by this means. It is not often that a French writer can be quoted, whose directions, of a therapeutical character, so nearly correspond with our practice, on this side of the Atlantic, as those of M. Andral (*Cours de Pathologie Interne*). He says: In this dreaded malady we act promptly and energetically. The first indication to be fulfilled is, to detract blood largely by venesection, which will be quickly followed by a vomit or a purge. Leeches are to be applied round the neck in large numbers; in a short time the intestinal canal is again to be acted on, and sinapisms are to be applied to the lower extremities: in a word, we should adopt a treatment eminently perturbating.

On this main outline of practice we must offer some remarks. The use of the lancet will be more serviceable in a case in which the patient is yet in the prime and vigour of life, than when he is farther advanced and his constitution impaired. It promises more, also, if the complexion is good, that is, if it indicate arterialization of the blood; as when the face is flushed, and even turgid, and eyes bloodshot. But when the face and lips, especially the latter, become livid, the expression anxious, and the eyes protruded and watery, we can no longer hope for a removal of the swelling and stricture of the glottis by general bloodletting, which has the disadvantage at this time of weakening the action of the heart and of the respiratory muscles,

and thus of disabling the patient from bearing up yet awhile against the depressing influence of the disease. But even in this latter stage it may be justifiable to open a vein, and to watch whether any relief follows the discharge of blood, an effect manifested by a somewhat less laboured inspiration, and an amended colour of the face and lips. If such a change take place, we shall be encouraged to let the blood flow until the main indication be fulfilled. Otherwise we promptly close the orifice, and prevent farther loss of the circulating fluid. When we have them at our disposal, leeches applied in the manner already advised exert a more evidently controlling influence over the inflammation of the laryngeal membrane than venesection. Both in the case of the child before mentioned, and in that of an adult, a married female, about thirty years of age, patients of mine, leeching arrested the disease, after copious venesection had failed to do so. But, in both, the amount of blood drawn in this way was large. From the adult nearly twenty ounces were taken, under my own eye, after venesection had been used to procure a smaller quantity in the early part of the day. Tartar emetic was also freely administered, both as an emetic and counter-stimulus. Dr. Francis of New York, about seventeen years ago, was attacked with acute laryngitis, for which he was bled to the extent of a hundred and fifty-two ounces in six days: and three or four days after, as he was still thought to be in a precarious state, he was bled again. (See a paper on Laryngitis by Dr. Beck, in his Journal, No. 12.) Dr. Cheyne (*op. cit.*) gives a still more marked case of the value of venesection, because the general appearance and the habits of the patient would not seem to bear such heroic treatment. It was of a young woman, who earned a pittance by gathering cockles on the strand at ebb tide, and afterwards by hawking them through the streets of Dublin. This person presented herself July 13th, 1813, on the second day of laryngitis, pale, scarcely able to articulate or swallow, the effort producing a convulsion, as when a crumb enters the windpipe, the voice sounding as if she were throttled, inspiration being slower than natural, and sibilous. The successful treatment consisted in bleeding her at noon, *ad deliquium*, which, by the way, says Dr. Cheyne, had nearly proved fatal. The venesection was repeated twice in the course of the evening. On the following day respiration was rendered difficult by the least exertion. Hitherto she was unable to swallow. She was again bled, and a purgative enema and blister were prescribed. Next day she began to expectorate yellow mucus, and could swallow fluids. On the 16th July, convalescence was begun.

Of the inefficacy of bloodletting on other occasions, a remarkable instance was presented in the practice of Dr. Armstrong. The loss of one hundred and sixty ounces of blood within six hours gave temporary respite to the difficulty of breathing, but yet it was so far from arresting the inflammation that death took place within twenty-four hours. The first accurately reported case of acute

laryngitis, and one which will ever have deserved historical importance attached to it, was that which proved fatal to Washington. "The disease," says Drs. Craik and Dick, his physicians, "commenced with a violent ague, accompanied with some pain in the upper and fore-part of the throat, a sense of stricture in the same part, a cough, and a difficult rather than painful deglutition, which were soon succeeded by fever, and a quick and laborious respiration." The General had himself bled in the night of Friday, 10th Dec., 1799, that of his seizure, to the amount of twelve or fourteen ounces. On the following morning "were employed two pretty copious bleedings, a blister was applied to the part affected, two moderate doses of calomel were given, and an injection was administered, which operated on the lower intestines, but all without any perceptible advantage, the respiration becoming still more difficult and distressing. Upon the arrival of the first of the consulting physicians, at half-past three in the afternoon, it was agreed, as there was yet no signs of accumulation in the bronchial vessels of the lungs, to try the result of another bleeding, when about thirty-two ounces of blood were drawn without the smallest apparent alleviation of the disease. Vapours of vinegar and water were frequently inhaled; ten grains of calomel were given, succeeded by repeated doses of emetic tartar, amounting in all to five or six grains, with no other effect than a copious discharge from the bowels. The powers of life seemed now manifestly yielding to the force of the disorder; blisters were applied to the extremities, together with a cataplasm of bran and vinegar to the throat. Speaking, which was painful from the beginning, now became almost impracticable; respiration grew more and more contracted and imperfect, till half-after eleven, on Saturday night, retaining the full possession of his intellect, when he expired without a struggle."

Harsh strictures were made at the time by English writers on the treatment of the illustrious patient by his physicians; particularly on the score of such large sanguineous evacuations. The disease was, in fact, at that time unknown — at least as laryngitis; and it was not until the year 1806, according to Dr. Cheyne (*op. cit.*), that a case was duly recorded as such. Dr. Monro, who was called into consultation, announced, as his opinion, that the symptoms arose from inflammation and thickening of the windwipe; and afterwards recommended, in case suffocation should be imminent, to perforate the larynx between the thyroid and cricoid cartilages. Laryngotomy was performed, but only after stertorous respiration had come on, and the countenance was changed from the purple of imperfect respiration to cadaveric paleness: the patient died two hours afterwards.

The most approved method of treatment recommended at this day will be found to vary little in its general features from that pursued in the case of General Washington. One very important means was not used by his physicians — the application of leeches. Objections have been made on valid grounds to vomiting the patient,

whose epiglottis in this disease remains stiffened and erect, and of course leaves the glottis open to the introduction into the larynx of fluids ejected from the stomach, or, at any rate, to the irritation of the *rima glottidis* in their passage from the esophagus into the mouth. But whilst we deprecate vomiting, we are not forbidden the use, in relatively large doses, of tartar emetic, which, in this form of laryngitis, as well as in croup, is tolerated to a great extent. By toleration, I mean its not causing either vomiting or purging; at the same time that it tends to abate arterial action. The medicine may be administered in quarter and half grain doses every hour, or even half hour, according to the intensity of the disease. A very minute fraction of opium combined with it will enable the stomach to retain it more readily, without diminishing its sedative or contra-stimulant effects.

If we are deprived of the use of leeches, cups to the nucha should be applied, after venesection, so as to detract as much blood as can possibly be spared from the laryngeal region. The two means of bloodletting may even be had recourse to in very severe cases almost conjointly, or in quick succession. Tartar emetic failing to produce the desired reducing effect on the system, without vomiting, or even after its beneficial but incomplete sedative operation, calomel, conjoined with minute doses of opium, should be given every hour, or at most two. If want of confidence be felt in the tartar emetic alone, or fears entertained by certain physicians that it must necessarily vomit in this as it is known to do in various other states of disease, the medicine may be advantageously combined with calomel and opium, and continued until relief be procured. After venesection and leching, a blister over the upper part of the sternum may be of service, or preferably on the nucha; and, if there be much, as often there is, spasm of the glottis and larynx, it may be dressed with morphia or belladonna ointment. For the relief of this symptom, while we are removing its cause — inflammation — assafœtida in mixture, with a few drops, in each dose, of the tincture of belladonna, will be of service. Gentle frictions, with the belladonna tincture, or liniment over the larynx and trachea, will contribute to the same end.

Mr. Crampton and others recommend the application of leeches to the inflamed palate and tonsils: the objection is not in any danger or subsequent inconvenience, but in the difficulty of the operation. The leech must be directed to the required spot by its being inclosed in a tube, the introduction and application of which is itself not a little irritating at any time; but in laryngitis must be productive of great distress. Remembering, also, the temporary tumefaction of the part to which leeches have been applied, we reasonably fear even a slight increase of this condition of the glottis, although it would be of short duration.

On one point in the treatment of acute œdematous laryngitis, there is unanimity of opinion. It is, to have recourse to laryngotomy so soon as symptoms of suffocation are exhibited, and the remedies

which have been employed do not exert a marked ameliorating effect. The designation by Dr. Baillie of the period of thirty hours of treatment, by bleeding and opiates, without relief, after which bronchotomy should be performed, is entirely too arbitrary. Dr. Cheyne very properly remarks, that "thirty-hours may be too long to wait, or it may be too short. If the circumstances of the patient, especially the condition of the circulating fluid, be such as to contraindicate bleeding, and to show that asphyxia is imminent, it may be improper to put off the operation for thirty minutes. If the complexion is good, if asphyxia is not threatened, the operation may be delayed for thirty days." Seldom, indeed, has the operation been performed soon enough to afford well grounded expectations of relief; for, as Mr. Ryland justly observes, (*Diseases and Injuries of the Larynx and Trachea,*) when the disease has continued some time, the lungs become gorged with venous blood, serum is effused into their reticular texture, and emphysema is likewise induced in them. The brain suffers, probably from the nature of the blood circulated through its vessels, and gradually loses its functions. The consequence is, such an exhaustion of the vital powers that reaction and recovery cannot take place even when the respiration is rendered free by means of laryngotomy.

But whilst stress is laid upon an early recourse to the operation, we must still not deprive the patient of the chance of recovery by omitting it even in the last and apparently hopeless stage. Mr. Goodeve relates the case of a patient of his who was quite insensible when the operation was performed; no pulse could be found at the wrist; his face was suffused with blood, and his lips livid; and it was hard to say whether he breathed or not, and yet he recovered. The spot to be selected for laryngotomy is the triangular space between the thyroid and cricoid cartilages, over the crico-thyroid membrane. An incision of an inch in length is made through the integuments along the central line of the neck, just over the crico-thyroid space; the edges of the wound are then separated, and the incision is continued down to the membrane, which, upon being exposed, may either be punctured with a trocar, or divided in a transverse direction with the scalpel. If the disease, for the relief of which the operation has been done, requires that the artificial opening be maintained for some time, it will be necessary to introduce a canula through the wound, and confine it there by bandages, as the irritation produced by it will cause strong expulsive efforts on the part of the patient; but if the disease is of a temporary nature, it will suffice to cut away a portion of the crico-thyroid membrane. Laryngotomy is more suited to adult males than to any other class of persons, because the larynx is lower in the neck, and its dimensions larger, and consequently the crico-thyroid space more ample (*Ryland*). The canula has been worn by different persons for a length of time without inconvenience; the periods varying from six months to fifteen years.

The mortality is great in acute laryngitis. Of twenty-eight

cases collected by Mr. Ryland, eighteen proved fatal; and even this is under the average, in his opinion.

Œdema of the larynx, which I have described in its acute stage, does, however, occasionally present itself in a sub-acute, if not chronic form, as part of general dropsy; or supervening gradually on phlogosis of another organ, with but little premonition of its approach. It constitutes the serous infiltration of Bayle. It is not less dangerous in this than in the acute form. Hydrogogue cathartics and diuretics, among which digitalis must not be forgotten, and vesication of the fore-part of the neck, will be the chief remedies. It is in this form that we may anticipate most from laryngotomy.

LECTURE LVIII.

DR. BELL.

LARYNGITIS MEMBRANACEA—CROUP.—Anatomical trait characteristic of the disease; lymphatic exudation in a membranous form in laryngeal inflammation—Phlogosis extends to trachea and bronchia; sometimes to the lungs—The chief seat of croup is in the larynx—Proof from dissections and the leading symptoms—Character of the breathing and the voice in croup—Dyspnœa evincing affection of the lungs at the same time.—*Causes*—referrible to locality, states of atmosphere, and age of the patient—Seasons in which it prevails—Mortality from croup in New York, Philadelphia, and Boston—Epidemic croup—Age at which croup is most common—Proportion of the sexes.—*Symptoms*—Precursory or common; and imminent and special—First and second stages.—Duration.—*Mortality.*—Varieties of croup—Spasmodic croup—Dr. Ley's theory—*Differential diagnosis*—Difference between primary and secondary or consecutive croup—Membranous exudation from air-passages forms in some other diseases.—*Treatment*—Intentions of cure—First remedy, an emetic—Tartar emetic to be preferred—Venesection—The warm bath—Leeching or cupping—Calomel with tartar emetic—In approaching collapse, perseverance in the use of calomel and stimulating and antispasmodic expectorants; blisters, epithems, etc.

LARYNGITIS MEMBRANACEA—CROUP.—Croup has received a variety of names: *Cynanche Trachealis, C. Laryngea, C. Stridula, Angina Palyposa, Suffocatio Stridula, Morbus Strangulatorius; Bronchitis*, by Young; and *Empresma Bronchilemmitis*, by Good. The attempt to designate this disease by a symptom, whether of a sound in breathing, or of a sense of imminent suffocation, must be misleading, because not exclusively belonging to it: and a term which implies its primary fixation in any other part than in the larynx is erroneous. Croup is now adopted, both by continental as well as English writers, and is a title which cannot mislead by its connexion with any hypothesis of cause or nature. In the United States the disease is known, among the people, commonly by the term Hives.

The anatomical trait which distinguishes croup from other varieties of laryngitis is the production primarily in the larynx of a false membrane. This production is secreted from the mucous or lining membrane of the larynx; it consists of albumen with a propor-

tion of phosphate of lime and carbonate of soda; and occasionally fibrin. It is corrugated and hardened by diluted sulphuric, nitric, and hydrochloric acids; and, on the other hand, rendered softer and diffluent by concentrated acetic acid, liquid ammonia, alkaline solutions, and a strong solution of the nitrate of potassa. Regarding this false membrane or lymphatic exudation as a product of inflammation, we should naturally expect to see the surface from which it is given out evince this morbid state. Accordingly the mucous membrane itself is often found to be rough, red and thickened; but at other times one is not a little surprised to find it unchanged in these particulars. It is no forced supposition, however, that the inflammation may be so far relieved by this pseudo-membranous secretion that there would be diminished redness, which, as in many other cases of greatly increased vascularity during life, disappears entirely by death. The same explanation will apply to those cases in which there is neither false membrane nor increased redness observable after death, although there had been unequivocal symptoms of croup before this termination. Even when we speak of this new product as the anatomical character of the croup, we must at the same time admit that it is not always present: it should rather be regarded as one of the chief proofs of an inflammation of the mucous membrane of the larynx, which may still be checked early, and thus the lymph will not be given out with sufficient freedom to form the membrane. Sometimes, in place of this latter lining entirely the cavity of the larynx, we find patches and shreds, and at times merely thickened mucus.

But farther observation shows, that the morbid action, in croup, is not long confined to, although it commonly begins at, the mucous membrane of the larynx. The trachea and bronchia are soon interested, and to such a degree as to be lined with this membranous exudation continuous with that of the larynx; and the bronchia are filled with a tenacious mucus. Evidences of inflammation may generally be discovered over the whole of the mucous membrane of the lungs: their cavity is always full of fluid; the interstitial cells are sometimes filled with serum. Nay, we have known, says Dr. Cheyne (*Cyclopædia of Practical Medicine*), parts of the lung hepatised, and inflammation to extend not merely to the parenchyma, but to the serous membrane, in consequence of which we have seen fluid effused into the cavity of the pleura. In many dissections the lungs have a solid feel, do not recede when the thorax is opened, and cannot be compressed. Some have divided croup into varieties according to the extent of the region of mucous surface affected; hence we have *laryngeal*, *laryngeo-tracheal*, and *laryngeo-bronchial*. We may not be able, nor is it very desirable for practical purposes, to designate in advance these varieties; but it is exceedingly important that we should be fully aware of the coincidence of tracheitis and of bronchitis, also, and at times even of pneumonia with croup, or the laryngitis of children. For the most part, the first lesions are felt and seen in the

mucous membrane of the fauces and larynx, and subsequently extend to the tracheo-bronchial portion. At other times the irritation begins at the bronchial terminations, is manifested in cough, and then suddenly and violently fixes itself in the larynx. Dr. Stokes, in treating of the primary inflammatory croup of children, lays down, as one of the most important considerations, *the complication with inflammation in the remaining portions of the respiratory apparatus.* In a considerable number of cases, he assures us, that the laryngitis is preceded by some inflammatory affection of the lung, which continues during its progress, but which is overlooked in consequence of the prominence of the croupy symptoms. "I have little doubt," continues the author, "that many children that die with symptoms of croup are carried off as much by disease of the lungs as by that of the larynx and trachea; for I have seen many instances in which, during life, the stethoscope indicated unequivocally the existence of intense bronchitis or pneumonia, and have invariably found that the diagnosis was confirmed by dissection." We cannot doubt the correctness of the opinion of a frequent conjunction of croup with bronchitis and pneumonia. In the few fatal cases of the disease, or at least of a pulmonary disease beginning with croup, which I have seen, this conjunction or complication was undoubted; the patient having recovered from the laryngitis, but sank under the pulmonary lesion. But it would be generalising too much were we to say, that in the majority of cases of croup, in its first stage and in its first attack, that pneumonia existed either antecedently to laryngitis, or even came on contemporaneously with the latter. The absence of the diagnostic signs, and the prompt and entire relief afforded, in many instances, by the very first remedy, an emetic, forbid such a supposition to the extent advocated by Dr. Stokes. In reasoning on the order in which the pulmonary complications show themselves, we cannot be unmindful of the effects of the mechanical impediments to respiration by the encroachment on the calibre of the larynx and the almost occluded glottis. The breathing will be laboured and hurried, the blood is imperfectly changed in the lungs; there is effusion of serum in their parenchyma, and accumulated mucus in the bronchial cells.

Special Pathology of Croup. — The seat of the inflammation of croup has been already stated to be the mucous membrane which lines the air-passages, and, in a more particular manner, the larynx and the trachea. The membranous exudation varies in thickness, consistence, and extent of surface over which it is spread: it is more commonly found in the larynx and upper third of the trachea than in any other situation (*Ryland*). Bretonneau gives three instances in which the false membrane extended from the epiglottis, without breach of continuity, to the extremities of the bronchial ramifications. In reply to the remark of Laennec, that this false membrane is generally found in the larynx, but that it very rarely extends above the glottis, we may cite the experience of Dr. Thomas Davis, who, in his published lectures, remarks, that of six prepara-

tions then upon the table before him, nearly every one presents the false membrane also in the inner surface of the epiglottis. We must even go farther, and admit that in a great many cases, especially those in which croup proper has been preceded by fever and anginose symptoms, that a lymphatic exudation forms on the tonsils and pharynx. M. Guersent estimates at nineteen out of twenty the number of cases of croup in the child originating in this way. This proportion is doubtless too large to represent croup in general. In twenty-six fatal cases of croup in the Children's Hospital at Paris, between 1834 and 1839, there were but thirteen with inflammation other than of the air-passages; in nine there was an accompanying membranous exudation of the tonsils, pharynx, and isthmus of the fauces.

As many English writers, and most of our own, persist in calling croup cynanche *trachealis*, and one of the former even takes credit to his countrymen for having established beyond doubt its tracheal seat, I shall adduce additional, I would call it conclusive evidence, in favour of the disease being more especially laryngeal than tracheal. Desruelles, in his *Traité Theorique et Pratique du Croup, d'apres les Principles de la Doctrine Physiologique*, 2me ed., Paris, 1824, quotes, or refers to the following writers respecting the seat of croup:—It is probable, says Vieusseux, that croup, which is suddenly fatal, is that in which the larynx is the part first affected. Royer Collard holds the same opinion. Bard has seen a whitish coat on the fauces, epiglottis inflamed, and covered with mucosities extending to the larynx. MM. Beauchêne, Sedillot, Carron d'Annecy, Leveque Lasource, Lechevrel, Latour, Valentin, Dejaer, Mercier, Carus, Regnaud de Lormes, have published cases in the *Journal General de Medécine*, in which a lesion of the larynx was manifest. Albers, after an inspection of the cadaveric phenomena, believes that most frequently inflammation arises in the larynx and upper part of the trachea. Boisseau (*Diction. Abregé des Scien. Med.*) says, the larynx is always affected in croup; it is also the only part. The bronchia are frequently intact, and are never alone inflamed. The trachea is never affected without the larynx being in a similar condition. Simple croup, in the opinion of Desruelles himself, has its seat in the mucous membrane of the larynx; but the false membrane is often thicker in the trachea, and the traces of inflammation greater in it. From these appearances, Dr. Jackson, of the University of Pennsylvania (*Amer. Jour. Med. Scien.*, vol. iv.), has drawn an inference that the exudation begins lower down, as in the bronchial ramifications, and, ascending to the trachea, ultimately reaches the larynx; an opinion coincident with that of Dr. Stokes already detailed. In two fatal cases, the symptoms of which and the *post mortem* appearances are described by Dr. Jackson, the membrane was continuous from the superior margin of the glottis down and into the bronchia, or the lungs. It became thicker in its progress downwards. The mucous membrane of the larynx, trachea, and bronchia, beneath this lining, was highly injected with blood and inflamed; presenting an appearance rather rougher

than common. Blaud (*Nouvelles Récherches su la Laryngeo-Trachéite — Connue sous le nom de Croup*) details twelve fatal cases, in all of which there was a membranous exudation lining the upper part of the air-passages; and in almost every case, when regions are specified, the larynx is shown to be affected, and thence mostly down to the middle of the trachea: in one instance the false membrane is stated to extend from the trachea to the bronchia and their ramifications. In the case of a child three years old, which terminated in six hours, false membrane formed, and was found after death, in the whole of the larynx and greater part of the trachea, adherent, and coming off in strips.

The character of the voice and breathing in croup, which arises from a spasmodic contraction of the constrictor muscles of the larynx, is further evidence of its laryngeal seat. The glottis can be voluntarily narrowed by some persons, so as to produce or imitate the sonorous hissing of croupal breathing. Croupal voice depends on two causes; viz., the spasm of the constrictor muscles of the larynx, and an alteration of the mucous membrane lining the vocal cords, by inflammation. Hoarseness, or a raucous voice, depends on the vocal cords in croup becoming softer and relaxed, by which the air is prevented from causing the complete vibrations in health. The thicker the covering of the mucous membrane, that is, the greater the inflammation, the hoarser will be the voice; and the hoarser the voice, the more serious the affection of the glottis and larynx. This state may extend to aphonia itself, which is temporarily relieved by expectoration. A grave or base voice indicates a serious affection of the larynx and its vocal cords. An *acute* tone of voice is generally the result of a spasm of the laryngeal muscles, and of the smaller opening of the glottis.

We cannot understand, nor give any adequate explanation of spasmodic croup, or of the fits of threatened suffocation in common croup, unless we admit the laryngeal seat of the disease. The irritating cause is in the mucous membrane of the glottis and larynx: by a reflex-motor action, the irritation of the membrane, transmitted to the brain, causes a return of innervation on the muscles of the glottis and larynx, and they are contracted with more or less violence. The cerebral excitement is kept up in these cases, and often augmented, 1, by the external air which is not in relation with the morbid sensibility of the inflamed organ; 2, by the duration of the inflammation itself; 3, by the various products of inflammatory secretion, which, like so many foreign bodies, irritate the air-passages. Hoarseness, or an equivalent condition of voice, may be the fixed one in croup; but the modifications depending on spasm of the laryngeal muscles must be considerable. The spasm may be continued, remittent or intermittent; varieties which may exist in laryngitis with false membrane from the glottis down to the bronchia. A suspension of the more violent symptoms may take place, and the disease seem so far to be *intermittent;* but it is the spasm of the muscles, not the secretion of the exuded membrane and croup

proper, which intermit. Inflammation of the membrane, like any other of the phlegmasiæ, is liable to exacerbation; but in its epoch it does not correspond with the spasm or fits of laborious breathing and imminent suffocation. The spasm of the glottis is most common at night; and hence a mucous irritant, hardly a source of complaint during the day, may, without any, or with very slight increment, be a source of imminent suffocation at night, owing to the greater susceptibility of the nerves and muscles at this time. Death rarely results from the occlusion of the glottis, by the thickening of the mucous membrane, or the superposition of false membrane on this latter; but it may by the spasmodic action of the muscles. Even where the false membrane is formed and adherent, the breathing is sometimes free just before death.

But, although the characteristic symptoms of croup depend on organic lesion of the larynx, we cannot render an account of all the phenomena of the disease if we overlook its tracheo-bronchial and even pulmonary complications. Of these I have already spoken. The dyspnœa gives a tolerable good measure of their presence and intensity. Hence, when we see the lips of a livid or violet colour, the face tumefied, the eyes prominent and shining, headache, somnolency, comatose stupor, convulsions, a peculiar anxiety, hurried breathing, and throwing the head back, we recognise symptoms of impeded pulmonary circulation and decarbonation of the blood, and feel ourselves more urgently called upon to remove this state of things, whether the laryngeal symptoms proper be urgent or not.

Causes. — The circumstances under which croup most readily and generally appears, are in reference to *locality, states of atmosphere, and age.* As regards locality, we find that large bodies of water, running or stagnant, fresh or salt, predispose to the disease. A damp and cold atmosphere has a similar tendency; although we must consider cold as relative. An easterly wind with rain, and a reduction of the thermometer by a few degrees even in July, will bring on an attack in a child not suitably protected from these influences.

The influence of locality in the production of croup is manifested very clearly at Warsaw, particularly in the spring season, at the time of the breaking up of the ice in the Vistula; in the circumstance of the disease being worse on the banks of the river and lower part of the city than in the upper. It is comparatively rare among the children who live in the upper stories, or on the first stage. The children of the poor who reside on ground floors are the greatest sufferers. But, contrary to what we would suppose, croup is little seen at Venice, bedded in the sea; and it is more frequent in Florence, bordering almost on the Appenines, than at Leghorn, on a paludal soil, on the sea-coast.

Winter and spring are spoken of as the seasons in which it most frequently makes its attacks; but the line of separation between exposure and immunity from croup is not always designated by the

almanac. In New York the months exhibited mortality, during a period of sixteen years, in the following order: October, November, January, March, December, February, April, May, September, July, August, and June. Croup is represented to be more frequent when epidemic catarrh or influenza prevails; but the fact is only of occasional occurrence, for in some influenza seasons which I have witnessed I have not found such coincidence. In Boston, on the other hand, the disease would seem to increase at a faster rate than that of the population, the deaths, from 1811 to 1820, were 43; from 1821 to 1830, 245; and from 1831 to 1839, 376; being in these periods respectively 5; 21·3 and 25·9 per 1000 deaths from other diseases.

Croup has prevailed at times epidemically, although we may suspect that some of the accounts of its appearance in this way are really those of its aggravated endemical occurrence. Vieusseux of Geneva, in his *Memoire sur le Croup ou Angine Tracheale*, relates that croup has been observed to be epidemic in different parts of France. Between 1772 and 1783 it occurred twenty times in Geneva; from 1766 to 1784, four times in Tarascon; from 1771 to 1783, four times in Etampes; and from 1780 to 1784, four times in Beziers. It is not unlikely, as the inquiries of M. Bretonneau have satisfied him, that these visitations, or some of them at least, were of secondary croup or *angina diphtherite*, already described, Lecture VII. Valentin (*Recherches Historique et Pratiques sur la Croup*, Paris, 1812), who lived for some time and travelled extensively in the United States, and is known to some of our old physicians, speaks of the epidemic returns of croup at Cremona, in Italy, in 1747 and 1748; at Frankfort on the Main in 1758; in Sweden four different times; at Franconia in 1775; also in Warsaw in 1780; at Altona, Tubingen, and Stuttgard, in 1807, and Vienna in 1808. He also mentions the disease having appeared in this way in Portsmouth, Virginia, in 1805.

Dr. Valentin gives some statistics of croup in this country, thirty-six years and more ago, which are not without interest as forming data for comparison with its mortality at this time. Thus in the city of New York the deaths from croup in 1804 were 75, in 1805 to 70, and in 1806 they were 106. The population of that city at the time was estimated at 70,000 inhabitants. If we compare these returns with the mortality in 1838, which was 182, and in 1839, which was 141, and bear in mind the increase of population, we shall draw the inference that croup prevails less extensively now than formerly in New York. The average number of deaths annually from croup, for a period of 16 years, from 1819 to 1834, was 140; or 1 death from croup for 37·3 of other diseases. In Philadelphia, in 1807 the deaths were, in all, 2045, of which 54 were from croup; in 1808 the annual mortality from all diseases was 2271, and from croup 53. On referring to the mortuary returns for 1838, I find the deaths from croup in this city were 101, and in 1839 but 83; leading to the same conclusion as that just drawn respecting New York.

As respects age, croup may occur at any time between the second or third month after birth and puberty. The younger children are when weaned, the more liable they are to the disease. Out of 350 cases presented in a tabular form by M. Andral (*op. cit.*), 21 took place between birth and eleven months after this epoch; 61 between a twelvemonth and two years of age; 45 between two and three years; 54 between three and four years; 42 between four and five; 39 between five and six; 29 between six and seven; 3 between seven and eight. From the period between eight and twenty years of age, there were but 27 cases; and between twenty-six and thirty, none. At thirty and at thirty-four years of age there were, respectively, four: and one was reported at seventy years of age. We may reasonably doubt its being genuine primary croup which assailed these persons in adult life. In the Philadelphia return for 1839, the only one before me, all the deaths were under ten years of age, viz., 19 in the first year from birth, 18 in the second year, 33 between two and five years, and 13 between five and ten years. In New York, of 88 males, I omitted to notice the females, 63 died under a twelvemonth; 25 between one and two years of age; and 43 between two and five years. The narrower glottis of a child than of an individual who has reached puberty is adduced as a probable predisposing cause of the croup in early life. The difference, says Dr. Cheyne, between the glottis of a child of three years and that of one at twelve is scarcely perceptible, whereas at puberty the aperture of the glottis is quickly enlarged, in the male in the proportion of 10 to 5, and in the female of 7 to 5; the bronchia at the same time enlarging, and the voice undergoing a corresponding change. Respecting the relative liability of the two sexes, it would seem that this disease is much more frequent in males than females: of 252 cases treated by Goelis, 144 were boys and 108 girls. Jurine gives the proportion as 72 boys to 47 girls in 119 cases. The return in the New York Bill of Mortality for 1839, already mentioned, gives 88 males for 53 females. In Philadelphia, on the other hand, for the same year, the proportion was reversed, the deaths of boys being 38, and of girls 45.

Symptoms. — The symptoms of croup are precursory, or those common to catarrh and other affections of the larynx and bronchia, and imminent or special. Among the first are hoarseness, cough, and modification of the common voice, with some febrile irritation. These may exist a day or two before the others are apparent; or they may only show themselves a few hours before the more alarming and distinctive manifestations of the disease. Indeed, if we are to credit even formal professional accounts, we should be led to believe that sometimes croup shows itself at once, in all its intensity and danger, without any prodrome. But a more careful inquiry would have satisfied the narrator that the child, said to be thus suddenly and unexpectedly attacked, had previously some of the symptoms first mentioned, to which may be added, in certain cases, gastric derangement by the eating of some indigestible

substance. Hoarseness has a signification in children more distinctive than in adults; since, it seldom precedes common catarrh in the former, as it so commonly does in the latter; and hence, if accompanied with a rough cough, hoarseness should at once excite the attention of the parent, and induce a call on the physician.

The approach of an attack of croup, which takes place almost always in the evening, and generally at an advanced hour, or towards midnight, is often indicated, after a day of unusual exposure to the weather or getting the feet wet, by variable spirits, greater readiness than usual to laugh or to cry, a little flushing, and occasionally coughing; the sound of the cough being rough, like that which attends the catarrhal stage of the measles. More generally, however, the patient, after a period of sleep, gives a very unusual cough, which it is not easy to describe in words, but which is readily recognised by a person who has once heard it. Comparison of the cough in croup have been made to the coughing through a brazen trumpet, to the crow of a cock, and to the low sharp barking of a dog, or better still, to the noise made by a dog or a cat which has swallowed something the wrong way, as it is called, and makes half efforts at vomiting. A repetition for a few times of this cough rouses the patient, who now evinces a new symptom in the altered sound of his voice, which is puling, or whining, and as if the throat was swelled. The cough is succeeded by a sonorous inspiration, not unlike the kink in pertussis; the breathing, hitherto inaudible and natural, now becomes audible and a little slower than common, as if the breath were forced through a narrower tube; and this is more remarkable as the disease advances. The ringing followed by crowing inspiration; the breathing as if the air were drawn into the lungs by a piston; the flushed face; the tearful and bloodshot eye; quick, hard, and incompressible pulse; hot, dry skin; thirst, and high-coloured urine; — form a combination of symptoms which indicate the complete establishment of the disease (*Cheyne*). The sensation of pain about the trachea is indicated in young children by a frequent application of the hand to the throat. The patient exhibits great anxiety and restlessness, and frequent desire to change from place to place; he is thirsty, and drinks, and in many cases without difficulty, although, by some writers, difficult deglutition is mentioned among the diagnostic signs of the disease. At each inspiration the tumid larynx descends rapidly towards the sternum, whilst the epigastrium is drawn upwards and inwards. Such are the symptoms which indicate the first, confirmed, or inflammatory stage of croup, and which, violent as they are, sometimes subside about midnight, even without medical treatment; to return, perhaps, in the course of the following evening. But in general, unless the disease be treated with promptitude and judgment, the second stage, characterised by a new order of symptoms, comes on the following day, and terminates fatally.

This second stage is called the purulent, the suppurative, or

the suffocative. It may commence from the second to the seventh day, or, in the suddenly fatal, it may succeed the other in a few hours. This period is characterised by the absence of any remission, and the increased severity of all the symptoms, particularly the acceleration and diminished power of the pulse, and of respiration. The cough, from being loud and sonorous, becomes husky and suffocative; it resembles the cough which attends tracheal phthisis, and cannot be heard at any distance from the bed; the voice is whispering; the respiration wheezing; the countenance pale; lips livid; the skin motley; the eyes languid; the pupils are dilated; the iris with less colour than natural; a symptom, this last, which attends the advanced stage of diseases of the lungs; and mentioned by Dr. Cheyne, with a remark that it has been, he thinks, overlooked. The tongue is loaded and has purplish edges; thirst considerable; skin much less hot, and the stools dark and fetid; the surface of the body is covered with a cold, viscid perspiration; the feet and hands swelled. In this, the second stage, or that of suppuration, the breathing may be often remarked as most free in positions which are generally least favourable to easy breathing, as, for example, when the head is low and thrown back. There is seldom recovery from this stage, last described. Sometimes temporary relief is obtained by the expectoration of a portion of the albuminous, membranous, and muco-puriform matters obstructing the larynx and trachea. When the excretion is free, recovery may take place, but slowly; but when it is scanty, or if the inflammation has extended downwards, through the bronchia, as it usually does when thus severe, the issue is commonly fatal. In this case the patient tosses about in great distress; he seizes on objects around him, and grasps them convulsively for a moment; he throws his head back, seizes his throat as if to remove an obstacle to respiration, makes forcible efforts to expand the lungs; and after a longer or shorter time of such distress, seldom above twenty hours, he expires, sometimes with signs of convulsive suffocation, but as frequently with continued increase of the foregoing symptoms, and evidences of exhaustion of the vital energies, and in a state of lethargy. The stethoscope generally furnishes information in this period of the extension of disease to the larger bronchia. This extreme state of disease seldom lasts more than twenty-four hours: it corresponds with the stage of *collapse* of some writers.

When fatal, croup, at an average, occupies a period of four days: it has destroyed life in twelve hours. Sometimes, however, the second stage is prolonged for two or three weeks, and the patient, expectorating freely, emerges slowly from that which had seemed to be an utterly hopeless condition. Along with puriform fluid, of which the sputa chiefly consists, there is sometimes expectorated a white, soft, tubular matter, like macaroni stewed in milk, which is called the membrane of croup. We can hardly admit the chronic character of true croup, *laryngitis membranacea*. That the patient, relieved from the inflammation and its consequent morbid produc-

tions in the larynx, should suffer for many days, perhaps weeks, from the extension and persistence of a sub-acute disease of the bronchia and lungs, we can well understand. I have seen cases of this nature myself; and believe them to be of more ready occurrence, and, I may add, more frequently mortal in children of a strumous habit.

Mortality. — The mortality from croup has varied at different periods, and is rated very differently by writers in different countries. M. Andral estimates the recoveries to the deaths as barely 1 in 10; adding, that in a small village in France (near Treste-sous-Jouarre), during a period of epidemic croup, in 1825, of sixty children attacked, the entire number perished with the disease. It is encouraging to know that the treatment is more successful now, or, at any rate, the relative mortality is less than it was at the beginning of the present century. M. Double (*Traité du Croup*) has taken the pains to prepare a table exhibiting the results of the practice of fifty-eight writers who have published their experience in this disease, from which it appears that the number of cures is rather more than a third part of the whole. The authors being ranged in chronological order, we can make at once two classes, twenty-nine in each; and show that, whilst nearly four-fifths died of croup of those who had been attacked and who had been attended by the first class, not quite one half of the entire number attended by the second, or more modern class, fell victims to the disease. In the spring of 1760, that of its first appearance in the county of Lancaster, England, Mr. Fell, a surgeon, who announces this fact, adds that, during the season, six children labouring under croup were committed to his care, to all of whom it proved fatal. But even at the present day our professional vanity is rebuked at the great mortality from croup in different parts of Europe. In a capital like Paris, where all the knowledge and resources of the art would, we might suppose, be brought to bear for the cure of disease in every form, the American reader will be not a little surprised at the results of hospital practice, in croup, as exhibited in the prize essay on the subject by M. Boudet (*Archiv. Gen. de Medicine, Fev. et Avril*, 1842). Thus, of twenty-six cases of croup, received into the Children's Hospital in Paris, for a period of six years, or from 1834 to 1839, the deaths were twenty-two in number. In this year (1839), and in the two following years, croup was epidemic in Paris; the deaths from this disease having been in 1838, '39, and '40, respectively, 187, 286, and 326. In the Children's Hospital, in 1840, the deaths were 23, and the recoveries but 2; in 1840, during the first six months the deaths were 12, being the entire number of all the cases received in the hospital. This terrible mortality might reasonably be attributed to the deteriorated constitution of the poor children brought to the hospital, did we not read in M. Boudet's essay, that a physician, whom he names (M. Loyseau), living in Montmâtre, near to Paris, lost twelve out of fourteen cases, which he was called upon to attend at the houses of his patients. I have not the requisite data on which to express an opinion of the proportionate

mortality of croup in the United States; but, adding my own experience to that of my professional friends, I should say, that it is not nearly so great as that given in any of the preceding statements of European authors, particularly the continental ones. Cases of croup are of very frequent occurrence with us — the deaths compared to the number attacked, are few.

Before I speak of the treatment of croup it will be necessary to say something of its varieties and complications; for, on a clear understanding of these points will depend very much our selection of appropriate remedies. *Laryngeal* croup is distinguished by the symptoms already mentioned, and more especially great aggravation of the disorders in voice, speech, and breathing, with more or less feeling of strangulation and pain in the larynx. In the *tracheal* croup, in which, although the larynx is not free by any means from disease, the trachea is chiefly affected; there is a dry, shrill, or sonorous cough, and a sharp, lancinating pain in the course of the trachea, sometimes with slight tumefaction. The patient speaks in an undertone; but there is little hoarseness, and the voice and speech are not lost, or at least not so much affected as when the disease is seated partly or chiefly in the larynx. The cough, as the disease advances, although frequent and severe, has not the distressing sense of suffocation which accompanies the laryngeal variety. The fits of coughing are often followed by vomiting, or the rejection of membranous shreds, with a thick, glairy, and sometimes sanguinolent or purulent mucus. Generally the excretion of this substance is productive of much relief, which is increased after each discharge, unless the inflammation has extended down the ramification of the bronchia; and then the respiration continues to be extremely difficult, and the disease assumes all the characters of an acute bronchitis, and frequently terminates unfavourably. Cases of this description seldom run their course so rapidly as those do which chiefly affect the larynx. All the symptoms evince less severity, especially when treated early; and it sometimes continues twelve or fifteen days, but usually from five to nine.

Croup with predominance of *bronchial inflammation*. This variety corresponds with the *Cynanche Trachealis Humida* of Rush, and the *Mucous Croup* of some still more recent modern authors. I follow the specifications of its character as laid down by Dr. Copland (*op. cit.*). It is not unfrequent in young children of the lymphatic temperament, who are fat and flabby, with a white soft skin. It is often met with soon after the period of weaning, and in those who are brought up without the breast. It commences with coryza and the other symptoms of catarrh, and often with a little fever. After these have been present for some time, the child is attacked in the evening, or during the night, by a sudden hoarseness, and a suffocating, dry, sonorous, or shrill cough, with a sibilous inspiration. The countenance is pale and covered with perspiration, and the lips are violet. Several slight fits succeed to this first attack; the voice remaining hoarse and low, the respiration sibilous and slightly difficult; but a

remission usually takes place in the morning. In the following evening there is a return of the croupal cough in a slighter degree. Sometimes the invasion is more gradual; the remissions but slight, or hardly evident, and the accession of expectoration much earlier; the disease approaching nearer as respects its seat and character to acute bronchitis. After the first, second, or third day, the cough is no longer dry, its fits become shorter: it is sometimes accompanied with a mucous rattle, and begins to terminate in the expectoration of a thick, glairy mucus. The disease now assumes many of the features of, or passes into, bronchitis. It is the bastard or false croup of M. Guersent, more properly the *laryngeo-bronchial* variety of M. Dugés, milder in its character than the first, which I have described at length.

Thus far there can be no doubt about the inflammatory nature of croup, whether it be simply laryngeal, larnygeo-tracheal, or laryngeo-bronchial. The difference is simply in the degree and diffusion of inflammation along the mucous membrane of the air-passages; and the treatment in all must be of the same kind. But another variety with more distinctive peculiarities is alleged to be common in children, and every now and then to be seen in adults: it is called *laryngismus stridulus* or *spasmodic* croup, and is represented to be dependent on a temporary affection of the nerves, by which the muscles of the larynx are thrown into spasmodic action, and thus diminish so rapidly and greatly this canal as to cause feelings of imminent suffocation, and on occasions death itself. This variety of croup occurs chiefly in weak, irritable children of a nervous temperament and liable to worms. A quite different view of the cause of this affection was presented a few years ago in a work on the subject by the late Dr. Ley. He attributes it to a suspended or imperfect function of the branch of the eighth pair of nerves which is distributed to the larynx, caused, as he supposes, by the pressure of the enlarged cervical and bronchial glands. Children of a strumous and scrofulous habit are the greatest sufferers. Dentition is an exciting cause, by the swelling and inflammation of the glands to which it gives rise. The distressing symptom of crowing and prolonged inspiration is not, Dr. Ley thinks, owing to to a spasmodic closure of the glottis, but rather to an inability of this part to enlarge to its normal size, owing to the want of innervation from the diseased *glandulæ concatenatæ*. From the same cause, the transverse fibres, behind and connecting the rings of the trachea, losing their contractile power, the sputa accumulate; hence the "prodigous rattling in the upper part of the aspera arteria, resembling the sound which attends when there is phlegm that cannot be got up, scarce sensible when they are awake, but very great when they are asleep, described by Dr. Molloy; 'that kind of noise which an increased secretion of the mucus on the air-passages would produce,' noticed by Dr. North." The approximation of the sides of the glottis, thus produced, Dr. Ley argues, is owing to defective power of the opening muscles, and may be either complete or partial. If complete,

the child may be carried off by convulsions, or by asphyxia without convulsion. More commonly, however, the glottis, becoming gradually, but partially open, air rushes through the still contracted aperture, producing the sonorous inspiration so characteristic of this disease; and this commonly announces the partial recovery of the child.

The pathological views of Dr. Ley would lead to a prophylaxis which consists mainly in removing both the enlargement of the obstructing glands, and in giving tone to nutrition, so as to prevent their becoming subsequently diseased. But whilst admitting the propriety of this course as far as it goes, we cannot give our adhesion to the pathology on which it is founded. Croup is too readily as well as promptly curable, and yields too frequently to a removal of specific irritation, such as dentition, indigestion, &c., for us to suppose that it could depend on a cause so decidedly organic as that advanced by Dr. Ley.

In reference to spasmodic croup, in general, there is no sufficient diagnosis to enable us to distinguish it from common inflammatory croup. Cases of pure and unmixed spasmodic croup are rarely met with in practice, the intermediate states between it and the inflammatory variety being more constantly observed. It is worthy of notice, also, that, in the undoubted inflammatory and membranous variety of croup, the obstruction of the larynx, or the laryngeo-tracheal canal, by new formations, is not sufficient to prevent the access of air to the lungs, — but that a great part of the phenomena and consequences of the disease are to be attributed to spasm of the larynx and trachea. This, however, it has been justly remarked, is spasm caused by inflammation, for which no antiphlogistic will be equal to venesection. Its nature may be understood from my preceding remarks on the laryngeal seat of croup. Dr. Copland says, that he has scarcely ever seen a well-defined case of spasmodic croup unconnected with dentition; or one terminate fatally without the concurrence of convulsions in its advanced stages, or towards its termination; and it has very commonly presented evidences of cerebral congestion. Dissection has revealed, in some cases, albuminous concretions, sometimes extensive, but more frequently consisting of small isolated patches in the larynx; sometimes an adhesive glairy fluid, with vascular spots in the epiglottis and in the larynx. The congestions of the brain, particularly about its base and the medulla oblongata, and of the lungs, cavities of the heart and large vessels, which were also found, were most probably consecutive changes. Still it must be conceded that there is a variety of croup of primary origin meriting the name of spasmodic. It may be induced by a preceding attack of the inflammatory; it appears to be most common in strumous and scrofulous habits. To a sudden invasion of croup, following and apparently caused by indigestible substances, such as nuts, apples, &c., and which is promptly removed by their expulsion, the title of spasmodic would seem to be

applicable enough. In using it I could wish that we had a terminology which would serve to designate croup thus occurring in children, and sometimes, though but very rarely, it is true, in adults, in which there is a temporary congestion of the mucous membrane of the larynx and, often, trachea, and thickening of the vocal cords, constituting a morbid change very analogous to that which takes place in the bronchial ramifications, in nervous or dry asthma. The suddenness of the attack, its frequently gastric origin, and immediate removal, sometimes by an emetic, sometimes by a common antispasmodic, or opium or other narcotic, are farther points of resemblance between this nervous or spasmodic croup, and nervous or dry asthma. With both of these may be associated not only congestion, but actual inflammation of the mucous membrane, — that of the larynx in croup, that of the bronchia in asthma, — and both with very slight modification of symptoms may require decided antiphlogistic remedies, antecedent to and sometimes in place of those of the antispasmodic, opiate, and narcotic class just referred to.

In our *differential diagnosis* it is very important that we should not confound primary and idiopathic croup, either inflammatory or spasmodic, with secondary and symptomatic croup, in which the false membrane or puriform exudation is consecutive to an extension of that which lines the fauces and pharynx. The latter state is found in angina maligna, or *diphtherite*, by which latter term of late years it has been called by Bretonneau, and others after him, and under which it has engaged our attention. We are the more required to study this complication, as, unfortunately, some of the French writers, including even Laennec, have thought that it represented true croup, which, on this account, they have spoken of as not only epidemic but contagious. Such confusion in pathology must of course greatly obscure the treatment; and physicians, by an erroneous refinement, would be tempted to a practice in true croup that must be unfortunate and destructive, since it would recognise typhoid complications, which only exist with the membranous angina and secondary croup. The contrasted features of the two diseases are so well exhibited by Dr. Stokes (*op. cit.*), that I shall give them entire: —

PRIMARY CROUP.	SECONDARY CROUP. (*Angina Maligna vel Membranacea. — Diphtherite.*)
1. The air-passages primarily engaged.	1. The laryngeal affection *secondary* to disease of the pharynx and mouth.
2. The fever symptomatic of the local disease.	2. The local disease arising in the course of another affection, which is generally accompanied by fever.
3. The fever inflammatory.	3. The fever typhoid.
4. Necessity for antiphlogistic treatment, and the frequent success of such treatment.	4. Incapable of bearing antiphlogistic treatment; necessity for the tonic, revulsive and stimulating modes.
5. The disease spasmodic and in certain situations endemic, but never contagious.	5. The disease constantly epidemic and contagious.

PRIMARY CROUP.	SECONDARY CROUP. (*Angina Maligna vel Membranacea. — Diphtherite.*)
6. A disease principally of childhood.	6. Adults commonly affected.
7. The exudation of lymph spreading to the glottis, from below upwards.	7. The exudation spreading to the glottis from above downwards.
8. The pharynx healthy.	8. The pharynx diseased.
9. Dysphagia either absent or very slight.	9. Dysphagia common and severe.
10. Catarrhal symptoms often precursory to the laryngeal.	10. Laryngeal symptoms supervening without the pre-existence of catarrh.
11. Complication with acute pulmonary inflammation common.	11. Complication with such changes rare. [Gastric complications common.]
12. Absence of any characteristic odour of the breath.	12. Breath often characteristically fetid.

In the accuracy of one of the features (7) of true or primary croup, I must, however, express my disbelief. I need not go over the argument again, nor repeat the proofs of the downward extension of the lympathic exudation from the glottis and larynx to the trachea, and thence to the bronchia. I will just add one familiar fact to the proofs already presented, viz., alterations of the voice, of course glötteal disorders, preceding the other symptoms of the disease.

The occurrence of secondary croup, or of angina membranacea, with extension to the air-passages, is frequent in times of real epidemic croup; of which proof is furnished in the late epidemic at Paris, before referred to. The prevalence of exanthematous diseases, and great tendency to mortification of tissues, particularly gangrenous tonsillitis, was also apparent to all, and is so described by M. Boudet (*op. cit.*). This writer speaks of epidemic croup having been contagious, but without specifying the form of the disease which manifested this property.

In many instances of the malignant sore throat, the exudation thrown out from the inflamed surface forms a pellicle coextensive with the spread of the morbid process from the fauces to the pharynx and air-passages. In some cases, ulceration and slight apparent sloughing occur in the central parts and those first affected, whilst the surrounding surface and the parts subsequently diseased, become covered by a soft and easily lacerated exudation. The complication, with croup, of various states of angina or sore-throat — malignant or epidemic — whether commencing in the pharynx or in the fauces, and extending to the pharynx, is not uncommon. Bretonneau describes a remarkable epidemic affection of this nature, which he called *scorbutic angina*, or *angina maligna*. In eighteen cases of which he gives the dissections, the air-passages were affected. In five the disease occurred in children, aged from eight months to seven years, and in all of them the exudation was first formed in the pharynx. In one case it descended into the minute bronchia. The remaining thirteen cases proved

fatal by the air-passages having been attacked; and in one case the laryngeo-bronchial membrane seemed to be alone affected.

The lymphatic exudation is sometimes formed in the course of other diseases, as typhous fever, gastro-enteritis, chronic pleurisy, &c. In some cases the morbid action originates in the tonsils, and extends to the adjoining parts. In the croup epidemic in Buckinghamshire, in 1793, described by Rumsey, the croupal symptoms were stated to have been coeval with inflammation of the tonsils, *uvula*, and *velum pendulum palati;* and large films of a white substance were formed in the tonsils. Croup may also be complicated with *thrush;* and with all the exanthematous fevers, — *measles*, *small-pox*, and *malignant scarlatina.*

Treatment.—The intentions of *cure* of croup are properly defined by Dr. Copland to be, — 1st, to diminish inflammatory and febrile action, when present; and to prevent, in these cases, the formation of a false membrane, or the accumulation of albuminous matters in the air-passages; 2d, when the time for attempting this has passed, or when it cannot be attained, to procure the discharge of these matters; 3d, to subdue spasmodic symptoms as soon as they appear; and, 4th, to support the powers of life in the latter stages, so as to prevent the recurrence of spasms, and to enable the system to throw off the matters exuded in the larynx and trachea.

Called up in the night to see a child who, after having gone to sleep in the evening, is at this time suffering from well-marked croup, the physician ascertains the antecedent and collateral circumstances, in regard particularly to prior attacks, their duration and treatment, and the general habit and morbid predisposition of the patient, and then prescribes an antimonial emetic. He may find that, before his arrival, either ipecacuanha or antimonial wine, or the compound honey or syrup of squills, had been administered. If already nausea has ensued by means of some one of these, and the system shows a readily excitable impression to their action, it will, sometimes, be enough to continue the article in perhaps larger doses than had been given before his arrival. But if no amelioration has been produced, he should at once proceed to administer a solution of tartar emetic in a dose of from a quarter to a third of a grain, to be repeated every ten or fifteen minutes, until either emesis and the accompanying relaxation are brought about, or the medicine fails to vomit at all, or to abate materially the violence of the symptoms. In reference to the dose and frequency of its repetition, and the entire quantity of tartar emetic to be given at this time, we must remember, that the greater the phlogosis in general, but more particularly of the thoracic viscera, the greater will be the toleration by the system of the medicine; or, less equivocally expressed, the longer will be the time before its ordinary effects are manifested. Commonly, between one and two hours will be the interval in which the salutary operation of the tartar emetic may be expected. If after two hours' administration of the medicine in full doses it fails to even nauseate, recourse must be had, not to

other emetics, but to means calculated both to abate the now evidently violent disease, and to renew the susceptibility of the system to the tartar emetic. The remedy next in order, and the one indicated by the symptoms and our knowledge of the pathology of the disease, is bloodletting. If a vein in the arm can be found it should be opened — if there be failure in this respect, we may sometimes procure blood near the ankle-joint or the instep, both feet being immersed during the time of the flow of blood in warm water. You frequently will be recommended to open the jugular vein, on account of its being superficial. The operation is simple, but not quite so easy as you might be led to suppose; and the appearance of the thing is revolting to the mother and others present. But as essentials ought never to be sacrificed to appearances or prejudices, if we cannot open a vein elsewhere, we must not hesitate to draw blood from the jugular, even although there be sometimes difficulty, which I have not myself experienced, in stopping the flow. A diminished pulse, paleness overspreading the face, and a feeling of sickness, nausea, and even vomiting, are frequent effects of the detraction of blood, and evidences, in this case, of its having been carried to a suitable extent. Often, after venesection, free vomiting will be caused by the tartar emetic, which had been given before the operation, but often without any such effect resulting.

Associated with the two remedies already mentioned, viz., tartar emetic and the lancet, is the warm-bath; and hence it is proper that the physician, immediately on his arrival, should ask to have warm water in readiness in case of need.

Failing to produce the desired impression with the tartar emetic, and either fearing to draw blood from a vein on account of the prior state and diseases of the patient, or unable to perform the operation, owing to the vein being imbedded in adipose and cellular tissue, it is proper, if a regular bathing-tub is not at hand, to have a large wash-tub three parts filled with water of the temperature of 94°, in which the child should be immersed up to its neck. If the vessel is not deep enough for this purpose, a blanket must be drawn over its back, so as to cover the shoulders and leave the head alone free. The period of immersion will vary from one hour to two or three hours, according to the effect produced by the bath, and the other remedy or remedies which may be had resource to conjointly with it. The system which, before immersion, was intractable to the tartar emetic, will after a time evince its renewed susceptibility by nausea and free vomiting. It may be, also, that the attack is so violent and the danger imminent, as to require recourse to the appropriate remedies in quick succession: so that immersion in the warm bath will accompany the administration of the emetic tartar, and whilst the patient is yet subjected to the trial of this treatment, blood will be drawn from the arm or jugular vein. It rarely happens that a decided and salutary impression is not produced by these three agents in the cure of croup. I have found vomiting and the warm bath adequate to produce a complete solution of the

paroxysm in cases in which, but for the fatness of the children and consequent difficulty of finding a vein, I should like to have bled. The free perspiration begun in the bath is kept up the remainder of the night by having the patient enveloped in blankets, and administering minute doses of tartar emetic and a little sweet spirits of nitre, with a drop or two of laudanum each time. In the city, when the indication is urgent for the abstraction of blood, we can obtain the desired end by the use of leeches applied to the upper part of the sternum, or directly above the clavicle, on each side of the trachea. The same object is attained also by cupping between the shoulders, or on the nape of the neck. The quantity to be thus abstracted is a little more than an ounce and a half for every year that the child has completed.

In the few more severe cases, in which the course of the disease is still unchecked by vomiting, bloodletting, and the warm bath; or in which after partial relief there is a renewal of the symptoms, we direct leeches to the throat. If we are not called on until the suppurative stage is begun, and the distressing symptoms undergo scarcely any remission, we must endeavour to act on the mucous surface, and procure a detachment of the false membrane, by combining with tartar emetic calomel in full doses; and if the bowels have been already freely acted on, we add a little opium.

Impressed, as we should be, with a belief in the diffusive operation of mercury, and of its more especial action on the mucous membranes, we cannot hesitate to have early recourse to it in those cases of croup which do not yield promptly to tartar emetic and the lancet, as well as in those which evince complications of bronchitis or of gastro-hepatic disorder. To Dr. Benjamin Rush are we indebted for the free use of this valuable remedy in croup. Dr. Hamilton, on the other side of the Atlantic, soon adopted the practice, which he carried to a still greater extent than our Philadelphia professor. As the ultimate effects of mercury, when given in large quantities, are to attenuate the blood by destroying its fibrin and colouring matter, and to produce a cachectic state of system utterly incompatible with the existence of adhesive inflammation, we have indications for its use in croup. It may be given in doses of one to three grains, combined with a fourth or a sixth of a grain of tartar emetic, every two hours, until its effects are evinced on the bowels by increased and green alvine discharges. Afterwards, especially if the skin have lost its febrile heat and the excitement generally be diminished, a minute portion of opium may be added to the articles already mentioned; the more readily, too, if at intervals there is an aggravation of the distress in breathing by an apparent spasm of the glottis. The calomel once begun to be administered, its use should be persisted in until its desired effects are obtained; care being taken all the while to adapt other remedies, which may be employed at the same time, to the varying states of the general system. Thus, if there be a suffused blush of the face, turgid jugular vein, strongly throbbing carotids, with a

heaving of the chest, we may venture, even though venesection has been freely used, to apply leeches in the manner advised already, and sinapisms to the extremities. Evidences of depression of the vital powers, in a paleness of the face, coldness of the skin, and smaller pulse, will, on the other hand, require abstinence from the tartar emetic and recourse to the hot-bath, frictions of the surface, and warm infusion of the root of the polygala senega, and oxymel of squills, and even the addition of a little carbonate of ammonia. During all this time, the calomel will be regularly administered, until the breathing is free and equable, and the expectoration loose and abundant.

In the suppurative stage, or that of approaching collapse, we should stimulate the cutaneous surface by sinapisms to the extremities, volatile or turpentine liniments and epithems to the chest, or by a blister between the shoulders. More stimulating expectorants, consisting of the fetid gums, as assafœtida or ammoniacum, mixed with squills and ammonia, are also to be administered by the mouth, and enemata given, both to evacuate the bowels and to produce derivation from the seat of disease. A warm hip-bath will contribute to the same end. The inhalation of watery or other vapours, never easy to be done by adult patients, is still less so in the case of children: when it can be accomplished it is no doubt of considerable service.

The treatment of croup with bronchitis, or of croup followed by bronchitis, is nearly the same as for this latter disease. Cups to the chest, or between the shoulders, succeeded by blisters; and calomel with very minute doses of opium, and tolerably free purging, are leading means of cure at this time.

Having thus sketched the outlines of the treatment of croup of the severer kind, I must add a remark, that, in a majority of cases of this disease, an antimonial emetic will suffice to give immediate relief, and a purge in a few hours afterwards complete the cure. In spasmodic croup, or in that kind supervening suddenly on catching cold, or on indigestible matters in the stomach, even if it should be inflammatory, these remedies will generally suffice, on the day following an attack of croup. Febrile irritation, and unusual fulness of face and cough still remaining, we ought either to bleed, or to give full doses of calomel, until the mucous membranes of the air-passages are relieved. This is done both by the direct removal of their congestion and inflammation, and indirectly by the full action of the medicine on the gastro-hepatic apparatus. It ought to be laid down, as an invariable rule, that a purgative is to be given in the morning following an attack of croup of the preceding evening, if we would greatly diminish the probability of a fresh attack the second night. A croupy cough, without much fever or symptom of laryngeo-bronchial irritation, may often, in delicate subjects, be treated with antispasmodics, to which a little ipecacuanha or squills has been added. I have relieved entirely an adult from a second attack of croup by the extract of stramonium and blue mass given in pill.

Before speaking of local treatment in croup, and the probable utility of bronchotomy, — laryngotomy and tracheotomy, — let me bespeak your attention to some remarks on the curative powers of tartar emetic and of calomel, and, likewise, of some other remedies, in croup. The first two are not, I think, regarded in all their therapeutical bearings as they ought to be. But I postpone these subjects to another lecture.

LECTURE LIX.

DR. BELL.

True therapeutical action of tartar emetic and of calomel in croup—Practitioners who have employed calomel—Venesection—its advocates—Leeching—*Expectorants;* those of the antiphlogistic kind to be first used—Tartar emetic and opium; calomel and opium—Squills—The alkalies—Polygala senega; its alleged powers and true value—*Diaphoresis;* is sometimes critical; when useful, and how procured—Tartar emetic, as a diaphoretic, to be given in the smallest doses—Warm pediluvia and counterirritants to the lower extremities —Vapour bath—Warm bath not to be confounded with the hot bath—The arm bath—*Antispasmodics;* the best antispasmodics, venesection, tartar emetic, calomel, and the warm bath; opium, and afterwards assafœtida, camphor, &c.—*Topical remedies;* blisters—when and where to be applied—Stimulating liniments—Cauterization of the fauces and pharynx—Tracheotomy.—Laryngismus Stridulus; not identical with spasmodic croup as often met with —Description of L. stridulus—With affection of the glottis are associated spasms in other parts—Causes of the disease; the children most liable to it.—*Treatment;* commonly mild—mixed, hygienic, and medical.—Prevention.

Not unfrequently the relief from an attack of croup will be as permanent as it was speedy, by means of vomiting and its accompanying phenomena; and no other remedy after an emetic will be required for the solution of the paroxysm. I would lay stress on the words 'accompanying phenomena,' which I have just used; for it seems to me that they are overlooked by not a few practitioners, who think that the simple act of vomiting is itself the prime and sole means of detaching and expelling the morbid accumulations in the air-passages; and that the chief mischief from the disease consists in the mechanical obstruction of these passages. With such persons the selection of an emetic is a matter of comparative indifference, provided they can cause their patients to vomit. But a very slight retrospect of the pathology of croup must convince us, that, from the outset, our remedies should be selected with reference to their power of abating morbid arterial and secretory action, not only in the larynx and trachea, but in all the bronchial ramifications; and, also, sedation of the vessels of the lungs proper, as well as those of the brain. The effects produced by an emetic should harmonise with, and in degree be a substitute for, those caused by the next remedy, to which, if the paroxysm persists, we must immediately have recourse. This next remedy is venesection.

Now, we know of no emetic substance which is comparable in

these respects with tartar emetic. It diminishes the excitement of the heart and arteries, is a sedative also to the capillary tissue, checks morbid secretion, itself dependent on capillary excitement, and allays spasm — effects these manifested after vomiting, but which often precede this latter, and are independent of it. The mere act of vomiting is an evidence, rather than a cause, of relaxation: it will serve to eject mucosities and albuminous shreds and membranous exudations from the larynx and trachea; but there must have been an antecedent state of diminished excitement and turgescence of the mucous membrane, and its withdrawal from the adherent plastic lymph, before this latter can be readily detached and new formations prevented. It is true that certain substances, by a peculiar irritation of the gastric nerves, will call the muscular parietes of the stomach and the diaphragm and abdominal muscles into combined action, and give rise to vomiting: but their effect is confined merely to evacuating the contents of the organ; and if their dose have been large, they cause continued straining efforts to vomit, with, at the same time, little or no increased secretion from the tracheo-bronchial vessels and mucous follicles; but rather an accumulation or temporary congestion of the thoracic and cranial cavities. Such emetics as these, sulphate of copper, for instance, may produce continued expulsive motions; but their sedative effect on the mucous membrane of the air-passages being slight, or none at all, they fail to arrest its morbid secretion, or to produce a separation of that which is already formed. The notion, that the mere act of vomiting will separate, to any notable extent, adherent false membrane; or that the mere scraping off of membrane and glairy mucus will give much relief to a croupy patient, the mucous tissue of whose larynx and trachea is inflamed, is too purely physical.

Our object, then, being to abate and speedily remove the morbid excitement manifested by abnormal secretion, and the turgescence and injection of the mucous membrane of the air-passages, and particularly of the upper portion, we shall have recourse at once to the agent best calculated to attain this end. Some writers recommend us to use, in the precursory or forming stage of croup, ipecacuanha wine, or syrup of squills, and to reserve the tartar emetic for the inflammatory stage. Dr. Cheyne, who advises an emetic in the inflammatory stage, but without specifying the substance to be used, lays great stress on the peculiar advantages to be derived from the administration of tartar emetic in the suppurative stage. Having myself seen so repeatedly the failure of attempts to arrest the forming stage of croup by the domestic prescriptions of ipecacuanha wine, or even by the compound honey of squill (Coxe's Hive Syrup), I uniformly prescribe at once a solution in water of tartar emetic, proportioning the dose to the exigency of the case, that is, to the probable duration and degree of inflammation. By this means, the disease is either at once prevented from maturing, or we acquire a measure of its violence and an index to a speedy

recourse to the lancet. In a majority of cases of even distinctly formed croup, tartar emetic will be found adequate to stop the paroxysm, by removing the peculiar cough, restoring the voice to its natural tone, and giving ease to the respiration; while at the same time it procures the discharge of mucus, and, it may be, of albuminous shreds and portions of false membrane. The little patient in a state of languor hardly unpleasant, induced by the operation of the tartar emetic in the manner already described, now goes to sleep; and the anxious mother is in a great measure relieved from her solicitude for the remainder of the night.

Not only in the incipient stage, but in the milder forms of actual croup, are other substances preferred by some practitioners to tartar emetic; on account of the prostrating effects of the latter. Were our diagnosis so certain that we could ascertain positively the precise degree and duration of the changes in the mucous membrane, from its first increase of natural secretion to the exudation of plastic lymph, and the congestion and thickening of the membrane itself, a graduation of medicines at this time might be attempted; but as this is not in our power, and as we know that, from the first coming on of hoarseness and cough, precursory of croup, there is a tendency to increase of excitement and phlogosis of the passages, the safe practice seems to me to be that which shall prevent these probable and often dangerous and fatal results, even though it be at the expense of momentary strength, and with the tax of temporary prostration. I believe, therefore, that the early use of tartar emetic is not only the safer but the milder practice, as it will most probably prevent unpleasant consequences, and save the necessity of recourse to harsher and complex measures, which would be called for if medicines of less power had been used in the beginning of the disease. I have met with but one case in which alarming prostration was caused by a persistance in full doses of tartar emetic, after the violence of the paroxysm of croup had been subdued by the medicine. The mother mistook my direction, to give the solution conditionally, that is, if the symptoms returned after my departure, for a positive injunction; and the result was a sinking of the vital powers, and *deliquium* of my patient; from which state, however, I soon succeeded in restoring her by active frictions, sinapism to the epigastrium, and laudanum and ammonia internally.

You must by this time be fully aware of the therapeutical basis on which I rest my use of tartar emetic in croup, as well as in so many other of the phlegmasiæ. It is not merely as an emetic, but as a contrastimulant or sedative, opposed to inflammatory action irrespective of its procuring evacuations, that I habitually use this medicine. Its utility in this way is beginning to be perceived by some of the practitioners of Great Britain, one of whom, Dr. Wilson, of Kelso, relates his successful use of tartar emetic in croup; he having cured ten out of twelve cases. He gave, after leeches had been applied to the larynx, followed by warm poultices frequently renewed, the antimonial salt, in doses of one-fourth to one-

third of a grain, at first every hour, until a decided impression was made, and afterwards every two hours, till the patient was considered in safety. The toleration of the medicine did not extend so far as that it did not vomit at first quite freely; but it had no action on the bowels, which required castor oil or some other laxative to obviate costiveness. For children, Dr. Wilson properly directs from half a minim to a minim of laudanum in addition to the tartar emetic.

With these opinions, and the ground on which they rest respecting the operation of tartar emetic, you may readily suppose that I put no faith in blue vitriol (sulphate of copper). Its astringency following emesis is not a property which we want at this time.

It is not a little vexatious to find writers of established and deserved reputation take such limited views of the effects of *calomel* on various diseases. One will tell us, that unless it purges it will do little good; another assures us, that its administration will be useless in this stage of croup, because time is not allowed for it to touch the mouth. This last notion, that we cannot procure the full revolutionising and alterative effects of mercurial preparations in general, unless the salivary glands are inflamed and incipient ptyalism caused, is rank empiricism, and has completely blinded us to their therapeutical operation. Calomel, which we may speak of as in a great measure representing the other preparations of mercury, when taken into the stomach, acts very speedily on the mucous membrane of this organ and of the small intestines; and, in a short time, on the liver and pancreas, which, by means of their excretory ducts, are placed in close and continuous relation with the intestinal mucous surface. Soon the large intestines are affected, and increased defecation is the consequence. But the operation of the medicine even in purgative doses is not confined to the gastro-intestinal canal and its subsidiary glands: it is extended to all the other mucous surfaces—the respiratory in one direction, and the genito-urinary and its secretory apparatus in another; and is followed by increased expectoration and diuresis, together with an abatement of prior irritation which may have prevailed in one or other of these divisions. Calomel acts in a more especial manner on all portions of the mucous system, and through it on their glandular appendages; and hence its use is more immediately applicable to irritations and inflammations of the mucous membranes and their glands than to other forms of disease. Most mischievous has proved the notion that the general system is not affected by mercury, and notably by calomel, unless and until ptyalism is produced. Under the influence of this error, immense quantities of the medicine are introduced into the stomach, with the effect often of a great depression of the vital powers, and particularly of the functions of the nervous system, cold skin, excessive inertia, &c.; the prescribing physician all the while waiting for the action of the calomel. In this way the patient may be actually destroyed by mercury, without any suspicion being entertained of the fact by the doctors of the salivating school.

Calomel, says Delafontaines, Inspector-General of Military Hospitals, at Warsaw, is the first and the most efficacious of all the reme-

dies employed in croup. I regard it, he says, as a specific, at least as certain against croup as against syphilis. Albers and Olbers recommended and used calomel; sometimes alone, after venesection, sometimes alternating it with kermes mineral and musk. Frank, at Wilna, relies on calomel after venesection, general and local. Autenrieth used it to act on the stomach and bowels as a revulsive, and to prevent the formation of a false membrane. Copious and fetid alvine discharges were followed in a surprising manner by a removal of the affections of the larynx. Dr. James Hamilton, the younger, gave a grain of calomel every hour to children within the year, and two grains and a half for those two years old, until relief was obtained; then he gradually diminished the dose. Commonly, evacuations upwards and downwards resulted. A child, five months old, took thirty-two grains of calomel in twenty-four hours, and another took eighty-four grains in seventy-two hours. Two children were lost by the weakness which resulted from continuing the calomel after the symptoms of the croup had subsided. Drs. Kuhn, Redman, and Rush, gave calomel in large doses. Dr. Rush gave six grains two or three times a day. Dr. Physick gave thirty grains one day to the child three months old which was bled three times in the day. Bond first recommended it. Bayley used it. Bard also praised it, as augmenting the secretions and rendering them more fluid, and thus diminished or prevented the secretion and adhesion of the membrane. The use of calomel and enemata made up the chief treatment of Autenrieth, in croup.

On our chief remedy in croup, bloodletting, some remarks will appropriately find a place at this time. Venesection was first recommended by Ghisi, who was also among the first (in 1737) to describe the disease; then by Home, Crawford, Michaelis, Ferriar, and Cheyne. Balfour, Bayle, Middleton, and Cheyne, opened the jugular. Vieusseux (of Geneva), recommends, in the case of a child three years old, that venesection to the extent of six or eight ounces be practised, and then that leeches be applied to the neck, to be repeated if necessary. Michaelis recommends large bleeding; he has taken seventeen ounces of blood at once from a child six years old. But large and small are relative terms; the large bleeding is that which produces a decided impression at the time, by lowering the pulse, causing paleness, relaxation, and approaching syncope. This is the kind required in croup. Dr. Rush preferred frequent to copious bloodletting; he has taken altogether twelve ounces, in three different times, in one day. Dr. Physick has bled a child three months old three times in one day. Both these children recovered. Müller advocated and practised venesection. Dr. Dick, of Alexandria, carried it *ad deliquium:* thirty cures in a winter attest the value of his practice. Dr. Stearns, of New York, on the other hand, tells us that, of fifty cases of croup which he has treated without bloodletting, he lost but two, and in these there were complications. He does not think that venesection ought to be used in simple croup, because he does not believe the disease to be inflammatory. My own experience leads me to believe that in the majority of cases of croup the

lancet may be dispensed with, if tartar emetic be early used and persisted in, until an adequate impression is produced; but if this remedy fails to arrest the progress of the disease, and to remove the urgent symptoms, no time should be lost in having recourse to the lancet, or analogous means of sanguineous depletion. Arteriotomy has been practised by Drs. Olbers and Duntze of Bremen.

Local bloodletting by leeches is a common and favourite method with a great many practitioners. It is that preferred by the French, who direct the leeches to be applied to the neck, or between the ears. Some have pretended to specify the number which should be put on at a time, but, as in the case of venesection, the bleeding must be relative to the violence of the attack and robustness of frame of the little patient; and, also, to the vigour and quality of the leech. Michaelis recommended eight to twelve; Reil of Halle, ten to twelve; and he allowed the blood to flow afterwards until fainting was induced. This, generally speaking, in the first stage of the disease, is the proper practice. It is that followed and recommended by, among others, Mr. Robins (*Lond. Med. Gaz.*, 1840). He applies "a dozen or more leeches, as the case may require, to the upper part of the sternum, so as to produce a state of syncope as soon as possible, and then to check any excess of bleeding by the application of the nitrate of silver." Whenever the bleeding from leech-bites continues after the desired full effect is produced, measures ought to be taken at once for stopping it; and in order to prevent a repetition of sinister results, such as death itself, from the continued hemorrhage by leech-bites, the physician should give special injunction on this score; first, that the nurse or mother look, at short intervals, to ascertain whether the bleeding still continues, and then that she apply the prescribed means for arresting it; failing in which he himself is to be sent for. Mr. Yate, in commenting on Mr. Robins's practice just quoted, thinks that six or eight leeches are enough to put on any child under four years old; and after that age we may readily have recourse to the lancet. In drawing any deductions from the remarks of European writers respecting the number of leeches which they recommend, we must bear in mind that one European is nearly equal to three American leeches. At Geneva (Switzerland), where croup is so common, one of the fundamental parts of the treatment of this disease is leeching. M. Odier speaks of it as the most sure and expeditious means of curing croup. It is so well known, as he informed Dr. Valentin, whose work furnishes me with these comparative therapeutics in croup, that most of those persons who pass the summer in the country with their children provide themselves with leeches, in order that they may be able to apply them themselves, at once, in case of need; "and I know," continues M. Odier, "that several cases of croup have been cured in this way before the arrival of a physician." The very tender age at which we can draw blood by means of leeches is in favour of the practice. In the case of a child but a few weeks old, who was severely attacked with croup, and to whom I gave ipecacuanha, and even tartar emetic, without either vomit-

ing or relief following, I directed leeches to the fore-part of the neck, with the effects of almost immediate ease, and speedy cure. My own belief was coincident with that of the parents, that but for the timely application of the leeches the infant would not have lived, even if it had survived the night.

Expectorants. — While we recognise, as one of the chief indications of croup, the procuring a solution of the inflammation of the mucous membrane of the air-passages, and a detachment of lymphatic exudation which may have been formed on it, we cannot, as an inference, admit with equal readiness the propriety of giving expectorants, without a rigid inquiry into their mode of action. Emetics are expectorants, and of the best class; because they depress the system, while they encourage secretion from the laryngeo-bronchial apparatus. But, although we cannot continue for any length of time to vomit our patient, we can direct those medicines which make a near approach, in their sensible effects, to the emetic class, and in this way render them instrumental both in keeping down excitement and favouring expectoration, which last is not so much a cause or means of reducing congestion and inflammatory excitement of the air-passages and lungs, as an evidence and an effect of such reduction. Coincident with this view will be the administration of small doses of tartar emetic, combined with very minute doses of opium, or of calomel with the same addition; or of tartar emetic, calomel, and opium. These remedies will come in as adjuvant to the lancet and purgatives. When direct depletion has been carried sufficiently far, we may substitute the squills, in form of syrup, for the tartar emetic, unless the excitement runs high; and direct at the same time polygala senega in syrup, or, what is preferable, in the form of sweetened decoction, with nitre — letting one or both of these be given alternately with calomel and opium. As more nicety is demanded in the use of opium at this time than of any other medicine, it will be well, whilst administering regularly the other articles mentioned, to direct it conditionally, according to the state of the bowels, and the restlessness, agitation, and wakefulness of the patient, and to leave word with the nurse or attendant to either add a drop or two of laudanum in every second dose of the other medicines; or to mix with the latter a definite proportion at these times of a syrup of laudanum or of acetate of morphia, prepared for the occasion. Together with squills, the most approved expectorants in croup, under the supposition that we have reduced the general excitement as much as in our power, without producing a too great and alarming prostration of the system of our patient, are ammoniacum, senega, and the carbonates of the alkalies, to which some add, but not, as it seems to me, on sufficient grounds, camphor. Of these the alkalies are best calculated to diminish the plasticity of the blood; and hence they are entitled to be used in a state of arterial excitement and phlogosis, in which some other medicines of the class would be improper. We direct, according to the degree of excitement, either the carbonates of potassa and soda, or the carbonate of ammonia. The last is commonly reserved for states of great and commonly

alarming depression; but much more good would be procured from its earlier and freer use in this, as well as in many other of the diseases of the respiratory apparatus. Both it and its congeners, the fixed alkalies, ought to be steadily given at short intervals, with diluent drinks at the same time. Palloni gave sub-carbonate of potassa with assafœtida.

In the United States the polygala senega acquired for a time great vogue, as of itself commonly competent to the cure of croup. Dr. Archer, the father, and afterwards his two sons, Drs. Thomas and John Archer, of Maryland, most contributed to confer this reputation on the senega. It was the subject of the inaugural essay of the latter, when taking his degree at the University of Pennsylvania. To the outlines of treatment of croup laid down by Dr. Archer, few of us at this time will make objections. He recommends, in the first period of croup, venesection, mercurial purges and diaphoretics, chiefly tartar emetic. He has no reliance on blisters. After this comes his favourite senega, which ought, he thinks, never to fail, if the false membrane is not entirely formed; and when it is formed, the medicine will cause its expulsion, by the irritation of the throat and the cough which ensues. The decoction, which he prefers, is made by boiling half an ounce of the root in eight ounces of water down to four ounces. Of this a teaspoonful is to be given every hour or half hour, according to the augury from the symptoms. It stimulates, we are told, the throat, and acts as an emetico-cathartic; but it has cured without exciting vomiting. In the second period, calomel is advantageously given at the same time with the senega. Now, that the charm of novelty and the fervour of admiration in consequence have subsided, we are better able to estimate the senega at its real worth; and while we admit that it is a good adjuvant to other remedies, we must also add that it is one on which alone we cannot place much reliance. The *emetised polygala senega* of Dr. Bouriot may be enlisted more frequently in our service in the treatment of the first stage and more violent forms of croup. It is made by adding to Archer's formula an ounce of the syrup of violets and two grains of tartar emetic Of this compound Dr. B. gives a table-spoonful every quarter of an hour, in order to procure four or five ejections from the stomach; and then a tea-spoonful every hour or two as an expectorant. Gradually as the laryngeal and pulmonary oppression is relieved, the interval for giving the mixture may be increased. Among the means occasionally employed to promote expectoration is the inhalation of the vapour of water, or of vinegar and water. In one case, the child, a patient of Mr. Coigné, of Courbevoie, expectorated a membraneous sac, two inches and a quarter in size, after having eagerly snatched up a vessel holding pure vinegar for the purpose of fumigation, and swallowed four or five mouthfuls. The child was immediately seized with violent cough, threw up the false membrane, and was cured.

Diaphoresis is occasionally critical in croup. At least I have seen a child, whom I kept for upwards of an hour in a warm bath, where I administered to it tartar emetic so as to excite vomiting,

on its being afterwards wrapped up in a blanket, remain for several hours in a copious sweat, during which time the breathing became more and more easy. In the morning the patient awoke quite free from oppression, and only suffering from a little fever and some cough, which were removed by a purgative. In a somewhat more advanced period of the disease, after venesection and analogous antiphlogistic remedies, the coming on of diaphoresis is accompanied often by a relaxation of the laryngeal mucous membrane, freer breathing, and occasional excretion of tough mucus or muco-purulent matter. When the skin is of unequal temperature, the pulse frequent and contracted, and the breathing hurried, we may give with advantage saline sudorifics — the acetate or citrate of potassa, or of ammonia — in conjunction with minute quantities of tartar emetic or ipecacuanha wine, and a few drops of laudanum. The doses of tartar emetic should be decreased in the order of the following series of its therapeutical effects, from an emetic to a contrastimulant or sedative, then expectorant, and finally diaphoretic. It is a great mistake to suppose, as is, however, so commonly taught, that its property of causing sweat is manifested or bears any proportion whatever to the nausea it produces. Never are the diaphoretic effects of this medicine so satisfactorily exhibited as when the patient makes no complaint of sickness, nausea, or pain, nor experiences any sensation at the stomach or other organ. The full effects of sudorifics will be not a little increased by warm and stimulating pediluvia, or, in their stead, warm flannel wrapped round the feet, and friction of these parts with a warm hand. It was early remarked in the history of croup, by Ghisi of Cremona, that patients were cured by an abundant sweat towards the end of the disease. Dr. Walbourg informed Dr. Valentin, that in parts of Russia the Jewish women run with their children in their arms, when the latter are seized and almost suffocated with croup, to vapour baths, and remain there until a copious perspiration is induced. Returning home, they covered them up carefully. Some, he adds, are cured by this means, and slight remedies in addition.

One of the best aids to other remedies, and itself one of our best diaphoretics, is the warm bath. But in directing it, you must not fall into the careless, it may even be called blundering fashion, so common among otherwise exceedingly well informed physicians, of confounding the warm with the hot bath. You will read of objections to the former, which are only applicable to the latter, such as its unduly exciting the patient, determining blood to the neck and head, and flushing the cheek; and, in fine, inducing efforts the very reverse of those which we most wish for at this time. Direct the warm bath of the temperature I have mentioned in my last lecture, and you will find that your patient will be soothed and comforted, and inclined to go to sleep in a warm, diffused, and febrifuge sweat. Dr. Grahl, of Hamburg, adduces cases in proof of the signal efficacy of arm baths in croup. They are indicated, he thinks, at the commencement of the stage of exudation. He recommends

that the arms of the patient be placed in a vessel sufficiently deep to admit them to a hand's breadth above the elbow-joint, and filled with water as hot as can be borne. A cloth should now be thrown over the head of the patient, which, falling down round the edges of the bath, retains the vapour; and this the patient should be allowed to respire for a quarter of an hour at a time, repeating it at short intervals. The first application usually induces some degree of moisture in the Schneiderian membrane, and diminishes the dyspnœa. With its repetition the cough usually loses its hoarse tone, and the patient expectorates exuded lymph. Dr. Grahl admits, however, that when the symptoms are extremely urgent, calomel in large doses should be given, and adds a recommendation of much more doubtful propriety, that a blister be applied to the throat.

Antispasmodics.— Witnesses to the spasm of the glottis and larynx in croup, which often threatens suffocation, and at any rate interferes with the full expansion of the lungs and circulation through them, you will be naturally very desirous of removing it. With this view you may perhaps be induced to have recourse to antispasmodics. These medicines, in the common acceptation of the term in Materia Medica, are not, however, those on which you must rely in the early stage of croup. The best antispasmodics, experience will soon prove to you, are venesection, tartar emetic, calomel, and the warm bath, in the phlegmasiæ. After this opium is entitled to a preference, alone, or what is better, combined with the tartar emetic and the calomel. In proportion as the inflammation subsides, recourse will be had to the recognised antispasmodics, such as assafœtida, castor, camphor; and, I may add, extract of conium, and at this time digitalis, which sometimes serve very well to allay this irritability of the glotto-laryngeal muscles, by which they contract with spasmodic frequence and force under a slight irritation of the lining mucous membrane. They are used by friction, enemata, and inhalation, as well as by the stomach. Underwood praises highly assafœtida, both by the mouth and per anum, in which he is joined by Millar, Cheyne, Thomson, and others. Olbers and Albers place great reliance on camphor, and still more on musk. The practice of Dr. Rush was the simplest and best, viz., to prescribe a few drops of laudanum towards the decline of the disease. I would not go so far as Gregory and others, in recommending full doses of opium or laudanum after venesection and vomiting, in croup; but I well know that after these operations, and when we are giving the tartar emetic and calomel as antiphlogistics, or, as I prefer terming it, counter-stimulants, if we join a minute dose of an opiate to these medicines, as already recommended, we shall do more to mitigate and remove spasm and oppression, than by any of the more common antispasmodics, at the same time that we carry out, undisturbed, the indications of cure.

Of *topical remedies*, blisters are the chief ones, and those in most common use. The application of a blister ought always to be withheld

until a reduction of phlogosis has been obtained by emetics, antimony, and bleeding. The remedy is best adapted to the second stage, after the skin becomes cool and damp, and the pulse has lost its resistance and fulness. It will often cause a salutary cutaneous reaction, and aid the operation of tartar emetic and opium, or calomel and opium, in bringing on diaphoresis. Opinions are not uniform, as to the precise spot where a blister should be applied. The most common practice is, to place it on the fore-part of the neck, over the larynx and trachea; but there is no special advantage can be promised for its use in this way, to compensate for the probable increased afflux to the larynx and trachea; to say nothing of the pain and continued irritation at every movement of the head and neck which are felt until the vesicated surface is healed. We are deprived also of the privilege, if it should be thought desirable, of afterwards putting leeches on this part, the call for which may come up at different periods of the disease, even after we have begun to use blisters and other counter-irritants. The three spots for the application of a blister in croup, are the nucha, on the upper part of the sternum, and between the shoulders. Vieusseux regards them, after venesection, as the chief means of cure, — an opinion certainly, which greatly overrates their value. In bronchial complications good may be expected of them; but in order to be fully efficient, they ought to be kept in a state of suppurative discharge, by the repeated application of blistering or other irritating ointments to the vesicated surface.

Stimulating liniments, such as sweet-oil and aqua ammonia, oil of turpentine and tincture of cantharides, and acetic ether, rubbed over the larynx and trachea at short intervals, so as to keep up a permanent redness and injection of the cutaneous capillaries, have been had recourse to at different times with reputed benefit. Ammoniacal cerate, made of simple cerate, ℥i., mixed up with carbonate of ammonia, ʒi., has been applied every four hours in quantities of ʒij., on the fore-part and sides of the neck, which are then to be covered with a bag of hot ashes. The skin is soon studded with little pustules, which cause itching and a pricking pain for two or three days, after which the cuticle is separated and falls off. Dr. Copland speaks very highly of oil of turpentine sprinkled on a fold of flannel just wrung out of hot water, and then applied around the neck and throat.

I may, in this place, as it is classed among the topical remedies, mention cauterisation of the fauces and pharynx, by rubbing these parts over quickly with lunar caustic. The alleged effects of this process are to arrest, if it be done early, the spread and formation of pseudo-membrane in the air-passages, and at once to relieve the breathing and cough. In primary and common croup, while we do not forget cauterisation, we should be aware that it must not divert our attention from the more active and heroic measures so fully and pointedly recommended already.

Tracheotomy has been recommended as the last resource in

croup. Apart from the reasons, *à priori*, which would either forbid recourse to it, or show its nullity, we have unfortunately general experience adverse to its success. The different state of the mucous membrane of the larynx and trachea, owing to the lymphatic exudation on its surface in the advanced and last stage, from that in œdematous laryngitis of adults, independently of the complications or congestions of the lungs, common to both, forbid us to hope for the same benefit from the operation in croup that has followed it in the latter disease. Still, we have the favourable experience of MM. Bretonneau and Trousseau, who have performed it ninety-eight times. Of 140 cases of croup in which it has been performed of late years by different French surgeons, 20 *per cent.* have terminated in recovery.

Laryngismus Stridulus — Thymic Asthma — Spasm of the glottis. — I have already expressed my doubts whether *laryngismus stridulus* is properly identical with spasmodic croup. The latter mostly exhibits all the distinctly marked symptoms of the inflammatory variety, with the addition of increased difficulty of breathing and sense of imminent suffocation; the spasm being an incident in the train of inflammatory symptoms. In the laryngismus stridulus, on the other hand, the attacks will come and go, will return frequently, and, on occasions, without any sinister result, although in general a first attack should excite watchfulness on the part of the mother or nurse, and induce her to give early notice to the physician of a repetition of the disease. The period is still more restricted than that of croup, in which laryngismus stridulus is manifested; rarely exceeding three years from birth. Dr. Kerr (*Edin. Med. and Sur. Journ.*, 1838,) has known the symptoms of the latter to appear as early as eight days after birth. He agrees with Drs. Ley and Marsh, in the opinion, held also by Kopp, that the children who are most liable are those of a very full and large habit of body, and who exhibit marks of the strumous diathesis, or have sprung from scrofulous parents; but he also adds, and my own experience is confirmatory of the fact, that he has seen it in thinner habits, and in whom no scrofula could be suspected. It is characterised by attacks of spasm of the chest and severe fits of suffocation. The breathing suddenly stops, or rather there is an extremely slight, piping, imperfect inspiration, forced, as it were, through the contracted glottis. The respiratory sound has some resemblance to the crowing inspiration of hooping-cough, but is much smaller and more acute; it is still more like the choking attempts at inspiration made during the hysteric paroxysm. In some cases, but rarely, there may be five or six piping or whistling inspirations, and then a few deeper and stronger, alternating with expirations so slight as scarcely to be perceived. In extreme cases the respiration stops entirely; the small inspiratory pipe then takes place, either in the beginning of the paroxysm or on its termination, being quite suppressed by the strength of the attack; and this symptom is pathognomonic of the affection.

In addition to the affection of the glottis, when it has occurred with such intensity and frequency as to excite attention and alarm, there are commonly other symptoms associated. The chief of

these are exhibited in the thumbs being turned into the palms, and the hands more or less clenched, and when opened by force immediately returning to their former position. The feet are turned inwards and downwards, and the backs of the hands and feet are swelled. These symptoms are most distinct when the crowings are numerous, or, as just remarked, when convulsions are threatened; at other periods they are seldom present. The disease frequently terminates by convulsions; and more rarely is ushered in by them. Other parts of the muscular system are affected, as when the child is unable to stand or walk erect, or to swallow liquids, except when given in small quantities. In severe cases, the child does not void urine as frequently as in health, and the quantity of the secretion is diminished. In a few cases, continues Dr. Kerr, the buttocks, or groins, become tender, and exude watery lymph; and in perhaps every case of the disease, the buttocks, even when well covered, are as cool as if newly washed.

Mental emotion, such as any vexation, is apt to bring on a paroxysm. Frequently the child is awakened out of sleep by one. A current of cold air will produce the same effect. In some days from twenty to thirty attacks of crowing will occur. During some weeks the crowings will be numerous, and during other weeks there may be very few. During an attack, the sufferings appear to be occasioned wholly by the want of air, and are not unfrequently so great that the child becomes somewhat livid. Instances have occurred of a paroxysm of crowing terminating life by the glottis remaining so long shut as to occasion suffocation; but in general danger proceeds from the occurrence of convulsions. These are to be expected whenever the crowings become numerous. Sometimes they are succeeded by insensibility, and at other times the child becomes sensible as soon as the fit is over. In general, when the disease is approaching a fatal termination, the epileptic fits become more numerous, and the child dies apparently rather from the effects of convulsions than from any affection of the glottis.

Dr. Kerr thinks that laryngismus stridulus is almost always a consequence of cold: occasionally indeed it commences in summer, but only when the weather is cold, and especially if the child resides in a cold or damp house. Dr. Kopp, who has written fully on the disease, which he also terms thymic asthma, states, that all diseases of the respiratory organs predispose to it, — such as catarrh, bronchitis, croup, measles. Teething also predisposes to it. Autopsic examinations have not revealed any deviation from health in the larynx or trachea. If convulsions have occurred, the morbid appearances in the brain are similar to those produced by convulsions unaccompanied with laryngismus (*Dublin Journ. Med. Science*, 1838). This disease is obviously the same in its essential features as that described by Dr. Underwood under the head of *Inward Fits*, p. 109–10, and by Dr. Clarke as "A Peculiar Species of Convulsion in Children," whose account of it is introduced in a note by Dr. Hall, p. 111–12, to the last edition of Underwood. It also closely resembles, if it is not identical with, the *thymic asthma*, a detailed description and

pathology of which are furnished by Dr. Montgomery (*Dublin Journ.*, 1836). Mr. Hood had previously (*Edinb. Med. and Surg. Journ.* vol. iii., 1827) pointed out, after numerous dissections, the enlarged thymus gland as the cause of this disease. Taking into consideration all the phenomena of the disease, we must go farther in our explanation of its organic cause than Dr. Ley, who supposes a paralysis of the glottis to be induced by pressure of swelled glands on the recurrent nerves, and of Dr. Marsh, who suggests that the seat of the disease may be at the origin of the pneumogastric nerve. The real cause is, a lesion which will give rise not only to the affection of the glottis, but also to the convulsions, and occasionally paralysis in the muscles of the limbs as well as those of deglutition. This must necessarily be in the brain, or more particularly at the medulla oblongata. The explanation furnished by Drs. Montgomery and Kopp, of the disease they describe being caused by pressure of the thymus gland on the nerves, is too partial; the disease has came on from other causes.

Dr. Griffin (*Dublin Journ. of Med. Science*, 1838) sums up the essential facts connected with this disease, at the conclusion of an elaborate critical inquiry on the subject, as follows: "1. By the concurrent testimony of almost all who have noticed the affection, it occurs for the most part, if not wholly, in strumous habits. 2. It is frequently found in connexion with enlarged glands in the neck, and perhaps in the thorax. 3. It is frequently found in connexion with eruptions on the face, ears, or scalp. 4. It frequently terminates in convulsions, and is sometimes, though very rarely, ushered in by them. I believe it may be said, that nearly half the fatal cases on record terminated in convulsions. 5. It is met with in families in which children are subject to head affections or convulsions, but who have also the strumous disposition. 6. It is sometimes met with in connexion with an apoplectic or comatose state from the commencement, as in the cases of crowing apoplexy which I have described. 7. In a great proportion of the cases which terminated fatally there was not the least symptom of head affection through their whole course, if we do not look upon the occasional fits of breathlessness and crowing as indicative of it; and the children were as well, apparently, a few moments before death, as they were previous to the first attack of the disease, or as any children could be. 8. The complaint is sometimes, but rarely, attended by cough and permanent difficulty of respiration. 9. Perhaps it may be said that from one-third to half of all the cases of which we have any account, terminated in death."

Treatment. — That of the paroxysm would seem to be first in order from the nature and danger of the symptoms; but the duration of the fit is so short, that it is over before the physician can arrive on the spot. On the mother or nurse, then, will devolve the first measures in the emergency. The little patient should be raised and placed in a sitting posture, or with the body inclining slightly forwards, so as to allow the respiratory muscles their full power;

then he must be slapped on the back, cold water thrown on his face, and ammonia held to the nostrils. By these means the respiratory organs are powerfully stimulated; and crying, sneezing, or some other strong expiration is produced, so that the glottis opens, and the fit is terminated. Other remedies, and they are the same with those adapted in inflammatory croup, or where there is any doubt in the diagnosis, will then be had recourse to, viz., an emetic and the warm-bath. These failing, and life becoming rapidly, or being, in fact, extinct, artificial inflation of the lungs has been recommended, and laryngotomy practised, as the speediest method of accomplishing this purpose.

When the attacks of crowing are severe and numerous, or the attack of one is prolonged, the lower bowels should be emptied by an enema and some purgative medicine, such as calomel and rhubarb, or turpentine and castor oil administered by the mouth. Both constipation and diarrhœa occur, and may even alternate in the same subject, in this disease; the latter, however, will, I suspect, be found more an attendant on the former and apparently opposite state than is imagined; for when diarrhœa is present, the first part of every stool is hard and dry, and the last nearly as liquid as water; and if laxative medicine is given, the stools are more natural, that is, less tenacious and less watery. The looseness, in fact, here as we every now and then see it in adult subjects, is the effect of irritation of the rectum by hardened feces higher up. Commonly the rule is a good one, to procure two stools daily for the child affected with laryngismus, or threatened with it, and to avoid carrying the purging any farther; hence, if diarrhœa should follow, a purgative, or some magnesia or oil, with a drop or two of laudanum, may be given. Laudanum or its like given with other views, such as of allaying irritation or of procuring sleep, will generally fail. In illustration of the direct action on the larynx of morbid impressions or irritants in the stomach, I may state that I have carried off at once all the symptoms of spasmodic croup by an emetic, which discharged from the stomach an apple that had been eaten and very imperfectly masticated a few hours before. I have seen, also, most of the symptoms of laryngismus brought on in a child by its having eaten stramonium seeds, the discharge of which from the stomach by an emetic, which I prescribed, was promptly followed by a removal of all the symptoms.

Some of the German practitioners (Kopp, Hirsch, &c.) recommend a more active course, to diminish and prevent, as they allege, the recurrence of all undue congestion and nervous excitement in the heart and lungs, by low diet, large and frequent bloodlettings (every four or eight days), blisters and issues on the chest, constant powerful purgatives, &c.: also, to lessen the size of the thymus, by anti-scrofulous resolving medicines, such as mercury, iodine, &c. The difference of practice in these two outlines of the plan of cure, will depend entirely on the difference in robustness of frame and constitution of the child.

A knowledge of the predisposing and exciting causes of laryngis-

mus stridulus will guide us in the modification or abatement of the former and removal of the latter. Of these, cold has been already mentioned as the chief. A uniform temperature of the skin should therefore be maintained by suitable clothing, made not after the absurd requirements of fashion, but so as to protect the chest and shoulders effectually against currents of air, and the sudden transitions from a hot to a cold room, or damp entry, or the outer door. The upper garment should be of a woollen stuff or cloth, in winter, and made to fit up to the neck. A neglect of this rule by weak-minded and ignorant mothers, who are more afraid of the ridicule of their visiters at their children being dressed unfashionably, than of the imminent danger, and even prospect of death itself, of these same children, as pictured forth to them by their observant and conscientious physician, has produced incalculable mischief. That the feet should be well protected by thick shoes and warm stockings, is a point which is less contested. The notion that children, particularly those of the city, can be made hardy by partial exposure of their persons and irregular exercise in the open air, is as absurd in physiology as it is cruel and destructive in fact. Often a change of habitation, from a damp and well ventilated one to another that is dry and airy, will prevent the recurrence of laryngismus.

A predisposition most commonly met with, and necessary to be obviated if not entirely removed, is that of a strumous habit and scrofulous diathesis, sometimes associated with full and plump-bodied and well-complexioned children, and sometimes with pale, thin, and sallow ones. In both, the lymphatic glands are in a state of either unnatural development or of irritability; and in both digestion is more or less impaired. To the restoration of this function by the alternate administration of aperients and mild tonics, and the use of plain nutritive food, the attention of the physician will be therefore directed. The tepid bath, frictions of the skin, exercise in the open air, and a residence for a season in the country, will materially contribute to healthy nutrition, and an abatement of the scrofulous diathesis. With this particular view, the iodide of potassium and the iodide of iron will be usefully prescribed; and an ointment of the former rubbed on the enlarged glands of the neck.

The irritation from dentition will be diminished by occasional cutting of the gums down to the tooth, so that the lancet shall grate on it. Disorders of the scalp, which we are told to treat with great delicacy and caution in children, ought not, however, under the influence of this, on occasions, proper timidity, to be allowed to remain a source of irritation to the child, and one of the exciting causes of laryngismus. They can best be managed at the time when the child is under the regular operation of purgative medicines; and it will be found that their removal will contribute not a little to the comfort of the patient.

Convulsions occurring during the course of the disease will require a somewhat more active treatment than that which has just been sketched; not so much, however, with a view to cure the convulsive paroxysm, which would for the most part subside of

itself, but to remove the morbid condition of the parts, and notably the brain, irritation in which would endanger a return of the convulsion. In milder cases, five or six leeches applied on each side of the trachea will suffice: in more severe cases, the external jugular should be opened with a lancet, if we cannot have recourse to venesection in the arm, for the causes already mentioned. Attention should be paid to the state of the bowels, and means used for their being promptly evacuated, if constipation have existed.

A troublesome attendant on this disease is free and almost continued, and consequently exhausting, perspiration, by which the chances of fresh attacks are increased on exposure to any little inequality of temperature, and especially to humid cold. The curative measures in such a case will be frequent changes of clothing; sponging the skin every morning with tepid, and after a while cold salt water, and careful rubbing of it afterwards with a moderately coarse towel; carrying the child out of doors, or if this is not advisable, having the apartments better ventilated and cooler, if they were too warm before.

One of the best means of restoration is a change of air, even from one part to another of the same city; but if the child can be taken into the country, or to the sea-shore, its prospect of recovery will be greatly increased. See, on the subject of thymic asthma and morbid states of the thymus gland, the interesting papers by Drs. Roberts and Lee, of New York, in the *American Journal of the Medical Sciences.*

LECTURE LX.

DR. BELL.

CHRONIC LARYNGITIS—Its synonymes—Seat of the disease—Structural changes—Applicableness of the title, laryngeal phthisis.—Large proportion of ulcerations in the epiglottis, larynx, and trachea, in phthisical subjects—*Symptoms:* sensations, voice, aphonia, cough, breathing—Different species of chronic laryngitis,—a knowledge of, necessary for prognosis and treatment—Examination of the fauces and pharynx—To determine the state of the lungs: auscultation, percussion, and expectorated matter—Duration of the disease—*Causes:* age, sex, prior disease, vocal strain, atmospherical vicissitudes, habits.

THE disease which is the subject of the present lecture has been variously named. In addition to its technical designation of CHRONIC LARYNGITIS; LARYNGEAL PHTHISIS; LARYNGITIS WITH SECRETION OF PUS; it has received the popular ones of *Clergyman's Sore Throat; Throat Consumption,* &c.

CHRONIC LARYNGITIS may be the consequence of primary acute laryngitis and idiopathic; or it will show itself after a very brief, and by no means violent stage of acute phlogosis of the organ, and be combined with and a symptom of chronic affections of other parts, particularly of pulmonary tubercles, and occasionally of secondary syphilis. The effects of chronic irritation of the larynx vary, from a slight vascularity and thickening of the mucous membrane, to changes so extensive as completely to alter and destroy

the natural appearance of the canal. The successive changes in the laryngeal mucous membrane may be redness; thickening or diminished consistence; softening, partial or general; sometimes vegetations or excrescences of a considerable size. Pus may be met with on its surface; and often M. Andral has seen false membranes which, by their firm consistence and site, perfectly resemble some of the numerous varieties of the false membrane in croup. The inner surface of the epiglottis has been covered and incrusted, as it were, with a layer continuous from the larynx. The greater breadth of the larynx and *rima glottidis* in the adult than in the child, explains why the formation of false membranes is so much less alarming in the former than the latter. Participating in these alterations, the mucous follicles may become enlarged and thickened, and secrete more abundantly than common. They are often raised into small rounded spots, of a dull white or yellowish colour, and then they have been called tubercles. Ulcerations are met with, which, according as they are above or below the vocal chords, will cause impaired voice or complete aphonia: they have been chiefly met with in the epiglottis, the aryteno-epiglottidean ligaments, the vocal chords, and the base of the ventricles; and they may become so extensive as to give rise to fistulas. The number of ulcerations is generally in the inverse ratio of their size. They often extend to other tissues, and when they do, the thyro-arytenoid ligaments are the chief sufferers. The sub-mucous cellular tissue may be thickened, and appear under the form of schirrous chords, or be distended with effused serum. In this tissue have been found purulent collections and tubercles in every stage of development.

The muscles of the larynx are, at times, reduced in size; softened, or even entirely removed: and again they are in a state of hypertrophy. The disease being protracted, the cartilages become affected; the epiglottis may be thickened, ulcerated, carious, even completely destroyed. The thyroid cartilage is less frequently changed; the cricoid is sometimes hypertrophied and carious; the arytenoid may be destroyed; and, on the other hand, all the cartilages may be ossified. In general, the ulceration begins in the mucous membrane, and extends to the cartilages. Serous cysts, and even calculous concretions have been found in the ventricles of the larynx. — (M. Andral, *Cours de Pathologie Interne.*)

The propriety of the term *laryngeal phthisis* is supposed to rest on the occurrence of the symptoms of consumption and its fatal termination, in consequence of organic changes which take place in the larynx. That such cases have been met with is not denied; but the number is very small. In a great majority of those persons who have sunk under disease whilst attacked with chronic laryngitis, there has been found to coexist tubercles of the lungs. Sometimes these last follow, but more frequently precede the laryngeal affection. The upper portion of the air-passages chiefly suffers from ulceration in phthisis. Of one hundred and two consumptive

patients noted by Louis, the trachea was found to be ulcerated in thirty-one, the larynx in twenty-two, and the epiglottis in eighteen. In the whole of his researches up to the time of making this record, he met with only seven cases of ulceration of the bronchia. Hastings gives, it is true, a larger proportion; the mucous membrane of this part having been, according to him, ulcerated in all those (leather-dressers of Worcester) who died of chronic bronchitis. Andral tells us (*Clinique Medicale*), that of the whole number of cases of phthisis which have come under his observation, in three-fourths of them there were ulcerations of the mucous membrane of the larynx.

Even though chronic laryngitis without complication should seldom be productive of consumption, the designation *phthisis laryngea* will still be applicable to those cases of tubercular pulmonary consumption in which the disease is aggravated, the symptoms in a degree characterised, and its march accelerated by the laryngeal affections.

The SYMPTOMS of chronic laryngitis are local and general. The local are derived from the feeling of the part, the voice, cough, expectoration, state of the respiration, and deglutition. The general symptoms are often slight, and are only manifested towards the last stage, or occasionally at the onset of the disease.

The *uneasy sensations* are chiefly confined to the larynx, and in this are commonly in one spot only; as at the upper and lateral part, for example, of the thyroid cartilage. Sometimes there is a simple, pricking pain; at other times no complaint is made whatever, even when the larynx is the seat of extensive ulcerations. There is usually a tickling which excites cough, — sometimes a feeling as if an extraneous substance were lodged in the larynx; and again of erosion and burning, and even a lancinating pain. This pain is aggravated by coughing, speaking, and swallowing; especially if the ulcerations are above the ventricles of the larynx, and also by inspiring cold air, and by pressure on the larynx. But by far the larger number of persons with chronic and sub-acute disease of the larynx complain most of suffering, and that in some cases acutely, when they swallow. So continued and decided is this symptom that, in one case, my patient called on me, for the first time, to have an obstacle removed from his throat — retained pieces of fish-bone, as he thought. To reassure him, I introduced once or twice a piece of sponge, tied on whalebone, into the upper part of the esophagus. His real disease, violent sub-acute laryngitis with bronchitis, accompanied by a full, hard, and rather frequent pulse, was removed by repeated venesection, leeching the throat, cups on the chest, and free purging. The subject in this case was young, of a full habit, robust frame, and a full liver. He was one of the choir in a church, and his singing talent no doubt had been often put in requisition in the social circle.

Difficulty is sometimes experienced in swallowing, and a part of the food or drink is returned through the nose, at the same time

that the patient coughs violently, and is in danger of suffocation. These symptoms are generally attributed to loss of substance of the epiglottis, or excessive rigidity through inflammation, by which it ceases to cover the larynx during deglutition. In the disease before us, there are cases in which the patients are able to swallow, although the epiglottis was far from covering the glotteal aperture; and again deglutition was almost impossible, although the epiglottis was entire; but the tongue was enormously tumefied, as was the epiglottis, which was erect and stiff at the same time.

The *voice* is almost always altered in its tone, and this change is one of the earliest symptoms of the disease. At first it is merely weak; but more frequently hoarse; and sometimes entirely extinct. The hoarseness is sometimes continual; and at other times comes on only when the larynx is fatigued, or the patient is exposed to a temperature which differs much from that in which he habitually lives. If the individual suffer from severe hunger, the hoarseness is much increased, but disappears after a meal. Immediately before menstruation, as well as after venereal indulgences, the hoarseness becomes greater. Dividing the duration of the disease into three periods, it will be found that, during the first the hoarseness is intermittent, during the second it becomes continued, and may so remain to the end, though more frequently complete aphonia supervenes during the second stage. Inequality of the voice is a common symptom in chronic laryngitis; more, indeed, than is suspected by the patient himself. When the larynx is diseased, the volume of the emitted sound is lessened; and, in general, the emission of air is proportioned to the intensity of the voice. Hence discordant and unequal intonation is avoided. But the voice becomes discordant and squeaking in those who attempt to give it the full development which it possessed before. This has been observed in several singers and pleaders, and in clergymen who persist in the performance of their clerical duties when their voice has lost its accustomed pitch.

Aphonia may be intermittent or continued. In the former case the voice is lost at night, while in the morning, or after a meal, it is merely hoarse. Continued aphonia is a bad symptom. That which comes on suddenly in the acute form of disease of the larynx, and continues when the disease has passed into the chronic form, is not nearly so alarming as that which advances progressively. That which succeeds mucous or catarrhal hoarseness is not so bad as that which follows the *stridulous;* which last is believed to depend on ulcerations or vegetations in the larynx. Alone aphonia is not of such bad import. I have had it to last some weeks in one of my patients who was subsequently restored to full health.

The *cough* is a constant accompaniment to chronic laryngitis, which cannot always be said of disease of the lower parts of the respiratory apparatus. It is hoarse, and even croupal, when there is tumefaction of the mucous membrane; and generally dry, or at

most partially relieved by puriform mucus and sputa mixed with blood. Sometimes pure blood is expectorated: at other times false membrane is expelled once daily for some months, and a more than usually copious discharge has been followed by convalescence and restoration to health. Mixed with purulent or sanguinolent mucus, are occasionally seen the remains of carious cartilages of the larynx. In those affected with aphonia or stridulous hoarseness the cough is very peculiar: it has been called eructation by MM. Trousseau and Belloc — the latest and most careful describers of the disease. The frequency of the cough is not, however, a measure of the state of the larynx; nor is it nearly so unfavourable a symptom as hoarseness and the change in the volume of the voice. Some persons on whom there has been found great lesion of this part have hardly coughed at all; whilst others have been teased with an incessant cough, in whom both the lungs and the larynx were sound.

The *breathing* is not much affected in the milder forms and early stage of chronic laryngitis; that is, when there is no diminution of the common diameter of the glottis. After the second stage of the disease is reached, anhelation is marked and goes on increasing until death takes place. This anhelation may proceed from two causes; muscular debility, the result of general weakness, or narrowness of the orifice of the larynx. In the latter case it takes the following course: at first the patient feels himself liable to what he calls fits of asthma, which most frequently come on at night; at a later period the severity of the paroxysm is increased, and the oppression is permanent. The patient cannot breathe on his bed, unless supported with pillows, and then the inspiration is habitually sibilant, and the expiration loud and prolonged. Paroxysms of true orthopnœa soon supervene, during which there is extreme anxiety and threatened suffocation; and, generally, in fifteen or twenty days from this time the patient dies suffocated. These nocturnal fits of asthma in chronic laryngitis are not always of such bad import. I have found them sometimes readily relieved by tincture of belladonna and sub-carbonate of potassa, or *liquor potassæ*, in a sufficient quantity of fluid, with sugar or syrup. Of this mixture, a single dose at early bed-time will suffice to ward off the paroxysm. When there is anæmia at the same time, a mild chalybeate in the morning more effectually prevents a return of the nocturnal fit.

When the *ulcerations* are situated at the superior orifice of the larynx, deglutition is impeded, giving rise to some uneasiness and cough; but in cases in which the epiglottis is in part inflamed or removed by ulceration, there is much dysphagia with a return through the nostrils of the drinks taken in by the mouth, and a fixed pain in the superior portion of, or immediately above, the thyroid cartilage. Still, as if to prevent positive conclusions respecting the effects of evident organic lesions, we learn, from Ma-

gendie, that there have been cases in which, notwithstanding the complete destruction of the epiglottis, deglutition was performed without abnormal symptoms.

In some cases of chronic laryngitis, pressure on the larynx by grasping it between the finger and thumb produces a crepitation, which is alleged to be caused by caries of the cartilages, and by some it has been regarded as a pathognomonic sign of *phthisis laryngea*. But renewed experiments showed that this occurs when the organ is perfectly sound.

Expectoration, in simple laryngeal phthisis, does not furnish very positive signs. It is commonly purely mucous, transparent, and not very tenacious; but when there is ulceration, the sputa, without losing these characters, are often mixed with little puriform masses and streaks of blood, and are brought up with slight effort, as if to clear the throat.

It is important to be aware of the *different symptoms in the different species* of chronic laryngitis or laryngeal phthisis. The progress of syphilitic is not the same as that of simple laryngeal phthisis. The latter generally originates in the larynx and trachea; whereas, the former usually spreads from the pharynx and nasal fossæ. It is, we are told, of great practical importance to attend to this, because experience shows that the larynx is usually affected in the same manner with the throat. Thus, when an erythematous syphilitic affection is observed in the throat, the affection of the larynx will not be of an ulcerous nature; and, on the contrary, when the pharynx and *velum palati* and nasal fossæ are deeply ulcerated, we may expect to find the larynx ulcerated or eroded.

In every case of chronic laryngitis we should examine the fauces and pharynx, in order to see whether, and to what extent, their mucous membrane is affected. Frequently, there are diseases of these parts and digestive disorder associated with that of the larynx, and although we may not be able to reach this latter by topical remedies, we can exert a salutary effect on it through applications to the fauces and pharynx. I have, after careful and repeated examination, detected in this way ulceration at the lower part of the space between the pillars of the palate adjoining the upper part of the larynx; on cauterising which, the laryngeal affection was greatly relieved. Elongation of the uvula is of itself a frequent exciting cause of cough and of irritation of the glottis, and through this latter of the whole respiratory apparatus. Its excision is often necessary for a cure, and at times the operation alone will be found sufficient for this end. An inspection of the epiglottis is very desirable, since the larynx is seldom severely affected without this part participating in the disease. Sometimes by getting the patients to utter loud cries during the inspection, the epiglottis, carried forward at each expiration, may become visible. As yet, little benefit has been derived from the use of speculums invented with a view to our examining the larynx by their means. The trials made to ascertain by the introduction of the finger the state of the epiglottis

and upper part of the larynx, must be regarded as hazardous, although the practice has been recommended with some emphasis in cases of suspected œdematous laryngitis, in order to allow of our obtaining thereby a satisfactory diagnosis.

Believing the title of laryngeal phthisis to be sufficiently comprehensive, both to express consumption which may result from simple chronic laryngitis, as well as that which has its origin in pulmonary tubercles, and to which the disease of the larynx furnishes some of the chief characteristic symptoms, I do not see the necessity of using the terms *tubercular laryngeal phthisis.* It is sufficient for us to be aware of the fact, that with organic lesions of the larynx of a chronic nature there is commonly complicated a tuberculous state of the lungs, which is, after a time, converted into true phthisis. In forming, therefore, our diagnosis and prognosis of diseases of the larynx, an examination of the state of the lungs can never be omitted. On this point, the advice of Dr. Stokes should be regularly and fully acted on. — (*A Treatise on the Diagnosis and Treatment of Diseases of the Chest.* Part I.)

"The first step in the investigation will be to examine accurately into the history of the case; and in particular to determine whether the laryngeal affection was primary or supervened on an already existing state of the lung. We must examine what were the first symptoms, and whether they were referrible to the larynx or lung. We must inquire into the past and present state of the fauces, and also whether a syphilitic taint exists. Now, should it be found that the first symptoms were those of a laryngeal character, that the voice had been altered from the outset of the disease, or that a syphilitic taint did really exist, we have a good probability, not that the lungs at the time of examination are free, but that the first morbid action was exerted on the larynx. But if, on the other hand, we find that, previous to the occurrence of any hoarseness, or stridor, or dysphagia, there has been cough without the laryngeal character — particularly if it was at first dry, and afterwards followed by expectoration — if hectic has existed, although the expectoration continued mucous; if there have been hæmoptysis, pain in the chest or shoulders; and lastly, if the patient was emaciated previously to the setting in of the laryngeal symptoms — we may be almost certain that tubercle exists, and that the case, so commonly called laryngeal, is in reality pulmonary phthisis; and if it appears that the patient is of a strumous habit, or has already lost brothers or sisters by tubercle, we may form our diagnosis with a melancholy certainty, even though, at the time, we can detect no certain physical sign of pulmonary tubercle."

It follows, from these premises, that we must have recourse, in our diagnosis, to the stethoscope, the nature and abundance of the expectoration, and the rapidity of the consumption. But, as Dr. Stokes has stated in the work just quoted, the sounds which would be conveyed to the ear through the stethoscope, and constitute the phenomena of respiration, are greatly obscured or masked

by the state of the larynx, when this part is the seat of the disease — a difficulty also mentioned by MM. Trousseau and Belloc. Fortunately, percussion serves us here instead of auscultation, and enables us to determine which lung, and of the diseased one which part is affected. "Under any circumstances," says Dr. Stokes, "the localized dulness points out that there is something more than laryngeal disease; and we know from experience that that something more is, in the great majority of cases, tuberculisation of the lung." This present, the disease of the larynx runs its course with greater rapidity.

Between laryngitis and tracheitis, either simple as such or associated with phthisis, it is difficult to distinguish. In the former we may expect dysphagia, and the voice to be more affected — in its being muffled, hoarse, or wanting — than in the latter. Among the terminations of laryngeal phthisis one of the most severe is swelling of the margins of the glottis. The primitive laryngeal angina (*acute œdematous laryngitis*), of which this is an accompaniment and a symptom, has been already described with requisite fulness; its inflammatory nature is contended for by the French writers just named. The consecutive is occasioned by organic lesion of the larynx and its connections, and may be either inflammatory or active, or non-inflammatory and passive.

In duration, chronic laryngitis will vary from a few months to many years. For us to augur a favourable termination, the disease should have made but little progress. When it has advanced considerably, and the system is weakened by dyspnœa, cough, prolonged abstinence, or marasmus, there is little hope of saving the patient. But as there are on record accounts of several patients in whom the disease had made great progress, and who were nevertheless cured, it shows the propriety, and indeed duty, of persevering in our endeavours to save the patient, so long as there is the slightest shadow of hope.

The CAUSES of chronic laryngitis are not always appreciable. Sometimes the disease originates under the influence of atmospherical changes. In such cases we find persons contract a slightly acute laryngitis, which soon passes into a chronic state and never leaves them. The inspiration of irritating particles or gases which escape in various manufacturing processes; a prolonged mercurial course; typhoid fevers, and debilitating causes in general; periodical exanthemata; foreign bodies in the larynx, occasionally give rise to it. Of the internal causes, unmeasured and protracted exercise of the voice is one of the most frequent and evident; as we see in the cases of preachers, pleaders at the bar, and other public speakers, and in actors and singers. Even here, obvious as is the exciting cause, we often see so little proportion between its action and the occurrence of the disease, that we must look to other collateral causes, and perhaps still more to the predisposition of the parties affected, as in a tuberculous and scrofulous constitution. Belonging to this predisposition will be general debility from deficient exercise, depraved

digestion and nutrition, excess in venereal indulgences, including masturbation and the depressing passions. The local predisposition may be found in a want of moderate exercise of the voice in the intervals between the formal and professional exercise and extraordinary strain on it; also, in continued irritation of dry hot air by a person habitually breathing such. Tobacco is a predisposing cause, both of general and local debility; a disturber of the functions of the lungs, stomach, larynx, and pharynx, both by perverting the secretions of the mucous membrane lining these organs, and by at first exciting and afterwards depressing their nervous power. Whatever tends to attract fluids in excess to the larynx, and to derange the circulation in its mucous membrane, as well as indirectly to weaken its muscles, which are those of the voice, by enfeebling innervation, must of course contribute to a morbid state of the organ. The use of tobacco may bring on all these derangements of function. But one would suppose from the obstinate perseverance in this filthy and eminently anti-social practice, that it placed the chance all on the side of health, rather than of that of disease and of a complication of unpleasant sensations more annoying to the sufferer than positive pain. The apparent exemption from deleterious effects in a few persons of a robust and phlegmatic habit of body, is no argument against the general rule. The same deceptive reasoning has been attempted to show the innocuousness of free spirituous and vinous potations in general. But how small the number of exempts out of the legions of those whose health and comfort and respectability have been ruined, and their lives abbreviated by such practices. Well have these privileged exempts been called the Devil's decoys—seducers of the thoughtless crowd to their undoing. The use of ardent spirits is, particularly in conjunction with exposure to vicissitudes of weather, a powerful cause of this disease.

Age and *sex* exert a great influence over the development of chronic laryngitis. Almost all the patients whose cases are recorded by different writers were between twenty and fifty years of age; the most of them between thirty and thirty-five. It appears, from the observations of Louis and Serres, that among individuals of the tubercular diathesis at least, the organic alterations in the larynx and trachea are twice as numerous among men as among women. Women are less subject to alterations of the organs of voice than men; and children, whose constitution is very analogous to that of women, participate in this immunity.

Mention has been made already of irritation and phlogosis of the fauces and pharynx being associated with similar states of the larynx, The disease of the latter is commonly in these cases, whether syphilitic or otherwise, consecutive to that of the former. In some cases of chronic gastritis, there is morbid redness and aphthæ of the fauces and pharynx, which extend, by continuous sympathy, to the glottis and upper part of the larynx, and give rise to alteration in the voice, cough, expectoration of purulent mucus, &c.

A restoration of the healthy state of the stomach, if accomplished in an early period of the disease, will bring about a removal of the laryngeal symptoms. In small-pox, we have frequent instances of this extension of inflammation from the fauces and pharynx to the air-passages, and the consequent changes in the voice and respiration, already described among the symptoms of chronic laryngitis; with this difference, that in the secondary laryngitis from small-pox, the disease runs its course with a rapidity which brings it within the stage of acute disease. A slight irritation of any part of even the buccal mucous surface, by establishing an afflux towards the throat, will develop chronic laryngitis; as, for example, a caries of one or more of the teeth. A celebrated singer, Mme. Mainville Fodor, the syren of the Italian opera, who enraptured the inhabitants of Paris in my time of study there, is said to have lost her voice in this way.

LECTURE LXI.

DR. BELL.

TREATMENT OF CHRONIC LARYNGITIS.—Rest of the vocal apparatus,—antiphlogistics,—counter-irritants,—narcotics, mercurials, iodine, sarsaparilla, balsam of copaiva, blue mass and syrup of sarsaparilla, sulphurous waters—Topical remedies: inhalation of simple and stimulating vapours; caustic to the parts; attention to anginose complication—Syphilitic chronic laryngitis: mercurials, sarsaparilla, iodine—Tracheotomy, when proper—Prevention of the disease—Clergymen,—rules for their guidance—Uniform temperature of air—Jeffray's Respirator—Change of climate.

THE TREATMENT of laryngeal phthisis will vary with its stage and the predominance of certain symptoms. In the first stage of the disease, marked by slight hoarseness, a feeling of heat and dryness in the throat, and imperfect expectoration or hawking of muco-serous matter, the remedies will be the same as for common catarrh. But if the inflammation does not readily yield to the simpler means, including abstinence from all kinds of excitement, and if the hoarseness is increased, and accompanied by aphonia and the characteristic cough before described, more energetic and systematized measures are required. The first condition for restoration to health is entire rest of the vocal apparatus, as far at least as speaking above a whisper. Provided there be no effort made by the patient to render what he utters more distinct, speaking in a whisper is not attended with any evil in the opinion of Drs. Trousseau and Belloc; but even this in conversation with a stranger, when an effort at a certain pitch is made, is sometimes more fatiguing to the patient than his speaking aloud. The indulgence of whispering is the more allowable, when we reflect on the extreme difficulty of keeping the patient silent for several months in succession. First among the class of *antiphlogistic remedies*,

applicable to the more decidedly inflammatory or incipient stage of the disease, is bloodletting. The authors just named prefer greatly venesection to leeches, unless these are freely used. But if the disease have made progress, or the patient be enfeebled, leeches are to be preferred; in which case they should be applied on each side of the larynx and trachea, inside the sterno-mastoid muscles. The feeling of relief expressed by the patient after their use is often very great. Cups to the nape of the neck I have seen to be of marked benefit; although perhaps not equal to the other methods of drawing blood. If there is reason to believe that the disease has arisen from suppression of the menstrual or hemorrhoidal discharge, or is greatly aggravated by such suppression, leeches ought to be applied, in the former case, to the thighs or the vulva, and in the latter to the anus. Emollients internally may soothe irritation without exerting any material influence over the disease; but their external use, in the form of warm poultices to the neck, will be injurious by increasing the afflux of fluids to the throat. Coinciding with bloodletting, and a useful substitute for this latter, is tartar emetic, given at first to vomit, and afterwards with a view to its contra-stimulant effects, in such doses, three or four times a day, as the stomach will tolerate. In cases of sustained inflammation, the vinous tincture of colchicum may be combined with the antimony, and occasionally, when the bowels are to be acted on, with Epsom salts.

After the disease has been of some duration, *revellents*, or *counter-irritants*, will be found to be among the most efficacious of our remedies. They are deemed more beneficial than bloodletting by MM. Trousseau and Belloc. Blisters are advantageous, but only when kept long discharging. They ought to be applied to the nucha, because when placed in front they create too much pain and irritation, especially in men with thick beards. Setons and the potential cautery, applied to the anterior part of the neck, opposite the crico-thyroid space, are, also, very useful. In milder forms of the disease, the eruption produced by rubbing a liniment, composed of croton oil two drachms to an ounce of olive oil, at first twice daily, will have a good effect. Next to this, and on the rising scale of activity, are the tartar emetic and the ammoniacal ointments, rubbed, as in the former case, over the front and sides of the larynx and trachea, until an eruption is brought out by the former, and a rubefaction or slight vesication by the latter. The antimonial frictions should be continued even after the pustules first appear, and until they are confluent, and then renewed when the scab begins to fall; and so on at intervals of perhaps twice a month while the disease lasts, or as long as there is any evidence of relief being obtained by the practice. I have used iodine ointment with beneficial results. The writers already quoted direct, as part of a plan of counter-irritation, and we may suppose in cases in which the frictions just specified have not been employed, a small piece of caustic potash, to be applied once a week on either side of the larynx and

trachea. In this way five or six cauterised spots are made to suppurate at the same time without the necessity of inserting peas to keep them open. Less confidence is to be placed in revulsives when applied at a distance from the diseased organ, unless in the case of suppressed discharge, as of sweat from the feet, hemorrhoids, &c.

Narcotics are often of great use in assuaging the pain and cough, in chronic laryngitis. Belladonna, stramonium, and hyosciamus, have been severally recommended: the two former, in the shape of diluted or semi-fluid extracts, by friction to the anterior part of the neck. The salts of morphia, introduced by the endermic method, are, also, a valuable adjuvant to other measures. M. Cruveilhier, with a similar intention, directs the patient to smoke the leaves of stramonium, or of belladonna which had been boiled in a watery solution of opium, and afterwards dried. By calming the cough, and allaying and removing pain, these narcotic remedies abstract causes of irritation and of flux to the larynx, and contribute to the cure. The use of the extract of stramonium in a two-grain pill twice or thrice a day, will have a more uniform effect, as I have ascertained by repeated prescription of this remedy in asthma complicated with laryngeal affection.

A mercurial course, that is, the action of mercury on the mucous secretors and capillary system—but always short of ptyalism — even in cases not syphilitic, I have found to be of manifest and permanent benefit; particularly in persons of a sanguine temperament and a rather full habit of body, or of active nutrition. In scrofulous subjects we must use mercury with more reserve, if at all; and where tubercular irritation is obvious the medicine must be carefully abstained from. In these cases, a decoction of senega with nitre; iodine — either a solution of the hydriodate of potassa, three to five grains twice a day; or Lugol's solution — iodine in water, in which the hydriodate has been previously dissolved, are applicable. In various chronic affections of the trachea and bronchial mucous membrane, as well as in the present disease, I have used the iodine with much benefit; and especially I have had occasion to be pleased with its effects, when it has been combined with the compound syrup of sarsaparilla. In cases in which the secretion is copious and mucopurulent the balsam of copaiba has done good; combined with sarsaparilla syrup, I prescribed the balsam on one occasion in what would be called tracheal phthisis, but in which the bronchiæ also were affected. The symptoms — consisting of expectoration, more than a quart in twenty-four hours, and accompanied by hectic and night sweats and a rapid pulse—disappeared under treatment of which this last combination was a leading part. The iodine had also been used in the manner already mentioned.

When mercury is thought to be proper in chronic laryngitis, the preferable preparation is the blue mass, in doses of five grains every night, with about the same quantity of extract of hyosciamus, made up into pills. In the morning, if the bowels are not free, and the digestive apparatus disordered, some mild saline, or rhubarb and

magnesia, will be used. This latter difficulty obviated, and a regular and defined course determined on, the blue mass and hyosciamus are to be administered every night, and the syrup of sarsaparilla in the morning. The dose of this latter will be from half an ounce to two ounces, according as it is found to agree with the stomach and bowels, by not oppressing the former nor purging the latter. I do not recommend this treatment as at all of a specific nature, as far as regards this or any other disease, whatever may be thought of its action on particular tissues. In the morbid secretions which accompany chronic inflammations of the mucous tissue, and in ulcerations of this tissue, in the respiratory, digestive, urinary, and genital organs, I do not hesitate to regard the blue mass, iodine, and the syrup of sarsaparilla, and occasionally the balsam of copaiba, as medicines of undoubted efficacy; so far at least as I can be influenced by my own experience, which in this particular entitles me to speak with some confidence. Sulphurous mineral waters, though of secondary importance, are useful adjuvants to the mercurial and iodine course, especially in recent cases of the disease.

But without the aid of *topical means*, the best devised general remedies are inefficient for the cure of chronic laryngitis, as they are of ulcerations and puriform discharges of the throat, nose, eyes, vagina, rectum, &c. These are laid down by MM. Trousseau and Belloc, as either emollient, detergent, or irritating; so as in the latter case sometimes to destroy the morbid surface itself. "They are either pulverulent, liquid, gaseous, in vapour, or salts." These gentlemen think that they have ascertained "a method of bringing medications in form of vapour, powder, or liquid, in contact with the mucous membrane of the larynx, without interrupting respiration."

Most frequently the *vapour of water* was employed, either simple, or charged with emollient, balsamic, or aromatic substances. Sometimes the vapours were dry, as the smoke of tar, resins, hyosciamus, tobacco, poppy, &c. The moist vapours have also been charged with *chlorine*, *iodine*, *hydro-sulphuric acid*, and different *essential oils*, and applied with some effect to the mucous membrane of the air-passages; as shown by the experience of MM. Bertin, Gannal, Cottereau, Richard, Sir C. Scudamore, and Dr. Murray, most of which is detailed in my work on *Baths and Mineral Waters*. This kind of medication has been taken up by some physicians lately, as if it were a new thing; and it has been made an affair of newspaper prescription and popularity. If, which I doubt, any physician gains by such proceedings, the good people at large are certainly sufferers by their being thus tempted to become their own doctors. Various kinds of apparatus have been made for the purpose of inhaling these vapours; but it is admitted, even by some of their inventors, that a simple teapot is as well adapted as the most complicated machine. MM. Trousseau and Belloc have also caused patients to inspire fumigations of cinnabar, sulphurous acid, &c., with various, but not recorded results. All inhalation, of whatever nature, is, however, liable to the objection that

the substance inhaled is not confined to the larynx, but comes in contact with the mucous membrane of the lungs, which it may irritate. It is impossible to limit its action, and hence the necessity of restricting ourselves to the employment of emollient, aromatic, balsamic, and narcotic vapours, and such as cannot exercise any sinister influence on the lungs. An objection, or rather a difficulty of more common occurrence, is the small proportion of these medicated vapours which pass through the glottis at all — closed as this is instinctively when any foreign substance in the air reaches it.

The *liquid medications* are much more easily applied, and without risk of injuring the trachea and bronchia. Of these, some are irritating; others simply astringent. The former are, muriatic acid, solutions of nitrate of silver, corrosive sublimate, sulphate of copper, and sub-nitrate of mercury, and the caustic solution of iodine as recommended by Lugol. The solution of the nitrate of silver would seem to be entitled to the greatest confidence, on account of its rapid action, its relative harmlessness, and its known efficacy in so many external ulcerations and other lesions of tissue. The strength of the solution will vary from half a drachm to a drachm in two drachms of water.

Various methods have been devised for applying the caustic to the larynx. The simplest is the introduction of a small conical paper bent at its end, and which has been immersed in the solution, into the throat, and down into the larynx, the mouth of course being kept open during the time by the crooked handle of a spoon. A piece of whalebone answers the same purpose, and more conveniently reaches the part affected. When it is desired to cauterize the pharynx, the base of the tongue, and the top of the larynx at the same time, MM. Trousseau and Belloc take a piece of whalebone about a sixth of an inch in thickness, and so that it will not bend too readily: this is heated at an inch or more from one end, and when softened sufficiently it is bent at an angle of forty-five degrees. To the end of this smaller portion a spherical piece of sponge is fastened, half an inch thick, which is moistened with a solution of nitrate of silver, and introduced in the following manner. The mouth open, and the tongue depressed as before, the sponge is passed through the isthmus of the fauces, which gives rise to an effort of deglutition and a consequent elevation of the larynx, and at this moment the sponge is brought somewhat forward, and from the entrance of the œsophagus it now passes into the glottis, and by a little pressure against the latter the fluid is squeezed into the larynx. The cough which is produced at this time favours the introduction of the caustic. Vomiting is often excited by the operation.

This plan, though not painful, is, according to its proposers, very disagreeable; and many patients refuse to submit to it a second time. These gentlemen have, in such cases, another means of effecting their object. To a small silver syringe, like that of Anel, a canula, at least five inches in length and curved at its free extremity with a very small opening, is attached. The syringe is

filled three-fourths with air, and one-fourth with a solution of nitrate of silver. The canula is then introduced into the posterior fauces, opposite the larynx; and the piston being rapidly advanced, the liquid mixed with the air in the syringe falls in a fine shower on the superior part of the larynx and esophagus. The patient is seized immediately with a convulsive cough and regurgitation, by which he throws off all the solution yet uncombined with the tissues. I have used, as more convenient, a piece of sponge sowed carefully to the end of a small sized gum-elastic catheter, with a rod in, and the end of which has the required curve given to it, so as to allow of a ready application to the opening of the larynx and borders of the epiglottis. The sponge is to be dipped in the solution as just now recommended. The patient is to be made, directly afterwards, to gargle his throat with water acidulated with muriatic acid, or salt water, which decomposes any of the free solution remaining in the pharynx.

Another mode of employing caustic solutions mentioned by Dr. Stokes, is that of Mr. Cusack. A brush of lint, of the requisite size, is sewed on the end of the finger of a glove, which is then drawn on the index finger of the right hand. The patient should be made to gargle with warm water, and the lint, being dipped in the solution, can be at once carried to any part of the pharynx, and even to the rima.

It has been appropriately observed by the two French writers from whom I have so largely borrowed for the pathology and treatment of chronic laryngitis, that one must have practised these cauterisations, or seen them performed, to have an idea of their harmlessness and of the little pain which results. We are very much alarmed at a cautery, for it is exceedingly painful when applied to the skin or mucous opening, though scarcely felt in the pharynx, larynx, or the neck of the uterus. I know that the application of a strong solution of nitrate of silver to the epiglottis and *rima glottidis* has been followed by very little pain, and did not prevent the patient from sitting down to table and eating his meals as usual in half an hour afterwards. These gentlemen in their valuable work* adduce the histories of several cases in proof of the superior efficacy of this topical treatment over any other. It has succeeded after the other means had been tried in vain.

Of the probable coexistence of *angina pharyngea* with chronic laryngitis I have already spoken. Again, I would remind the practitioner of the importance of being aware of this conjunction, and, of course, of the necessity of examining carefully the lining of the fauces and pharynx, and of applying to it appropriate topical remedies; emollients, if there be inflammation; caustic solution, or pencilling it with caustic, if the affection be chronic, and manifest itself either by a relaxed tissue, or by aphthous spots, or minute ulcerations. The portion of the membrane which in these cases more commonly requires to be treated in this way is that covering

* A good translation of this work of MM. Trousseau and Belloc has been made by Dr. Warder, of Cincinnati.

the tonsils and the arch of the palate. For this purpose, we should touch, two or three times a week, the part just mentioned with a pencil of nitrate of silver, or a solution of the same, or a powder composed of six or eight grains of the salt to about a drachm of powdered sugar-candy. In the same way, we employ powdered alum. Sub-nitrate of bismuth may be used pure; calomel with twelve times its weight of sugar; red precipitate, sulphates of zinc and copper, with thirty-six times, alum with twice, acetate of lead with seven times, and nitrate of silver with seventy-two, thirty-six, or even twenty-four times its weight of sugar. The apothecary should be directed to prepare these powders on a porphyry slab, otherwise small crystalline asperities remain, which act as irritants, and bring on repeated fits of coughing and the expulsion of the powder.

The insufflation is best practised by the patient himself, by means of a glass tube two lines in diameter and eight or ten inches long. Three or four grains of the powder are to be put into one end of the tube, and the other is to be introduced as far back into the mouth as possible. After emptying the lungs by a strong expiration, the patient closes his lips upon the tube, and then by a quick effort of the diaphragm draws his breath rapidly. The column of air, in traversing the tube, divides and hurries along the powder towards the pharynx; but a part suspended in the air penetrates the larynx and upper part of the trachea. We are apprised of its having entered the larynx by fits of coughing, which the patient should repress as much as possible, so as to preserve the medicine in contact with the affected tissue. These inspirations will vary in number, according to the sensibility of the larynx and the strength of the powder.

A saturated solution of corrosive sublimate, or of sulphate of zinc or of copper, will fulfil the same indication as the powders before mentioned.

When chronic laryngitis has a syphilitic origin it will be removed by mercury, and, at times, under circumstances of the most discouraging nature, as where the patient had been reduced to the last degree of emaciation, with hectic fever and night sweats. But let us not forget that this result is not certain, even in old cases of syphilitic laryngitis; and that mercury has in some of these aggravated all the symptoms. In these cases, the ptisan of Feltz has brought about a rapid cicatrization of the ulcers—Cruveilhier, *Dictionn. de Med. et de Chir. Prat.*). The ptisan here referred to is made of a decoction of sarsaparilla, China root, and other vegetable matters of less strength, in which sulphuret of antimony has been previously put, and to which, subsequently, corrosive sublimate has been added. A neater and more pharmaceutical method is to direct a solution of the mercurial salt in water, to which some simple syrup and a little of Hoffman's anodyne have been added; and afterwards, in the course of the day, the compound syrup or a strong decoction of sarsaparilla.

In the advanced stages of syphilis, in which the mucous mem-

brane of the mouth and throat was the seat of extensive ulcerations, I have derived excellent results from the iodine preparations already mentioned, conjoined with the syrup of sarsaparilla, in cases, too, in which mercury had either failed to relieve or had aggravated the disease.

There is, occasionally, an extreme state in this disease short of death, but which, if not relieved, ends in dissolution. I refer now to the imminent danger of suffocation in some cases: a present remedy for which is tracheotomy. But before having recourse to this last trial of our art, we should have given effect to the following appropriate remarks and suggestions of Dr. Stokes: —

"In some cases spasmodic exacerbations occur, so severe as to threaten the life of the patient. These are more frequently met with in females, and demand a careful study. The suddenness and violence of attack, the absence of corresponding fever, and of tumefaction of the epiglottis, will in general suffice for the diagnosis. I have often seen cases in which the suffering was so severe, as that, at the instant, performance of tracheotomy was advised, yet in which the breathing was restored to its ordinary condition by the following simple treatment: the feet were plunged in warm water, the body enveloped in blankets, and a draught, consisting of camphor mixture, ammonia, valerian, ether, and opium,—exhibited, and repeated according to circumstances. Under this treatment symptoms will rapidly subside, which from their character and continuance would seem to demand the knife; and I would advise that, in all cases, previous to the performance of tracheotomy in chronic laryngitis, the question be carefully investigated, as to whether the urgent symptoms are the result of spasm or of organic obstruction. Let it never be forgotten that, even where organic disease and thickening of the larynx exists, spasm may supervene, and be met by appropriate treatment. We are not much attached to the doctrine of diseases being necessarily separate, but experience tells us that nothing is more common than to see spasm following organic disease, or organic disease occurring after a purely nervous lesion.

"In cases showing this liability to spasm, the belladonna or other anodyne plasters may be usefully employed."

Tracheotomy, then, ought not to be performed except when the patient is threatened with suffocation, and all the promptly available medicinal means have been had recourse to. On these conditions, the operation having been performed, the physician, now freed from the fear of seeing his patient die of asphyxia, may proceed to treat the affection of the larynx in a suitable manner; and when the organ is capable of performing its functions, the canula can be withdrawn, and the wound allowed to heal. Even should the disease be of such a nature that the passage of air through the natural canal is afterwards impossible, the canula may remain for an indefinite period, and the life of the patient be lengthened. A case is given by MM. Trousseau and Belloc, of an individual wearing such an instrument, made of silver, for ten years. They state their having performed it seventy-eight times; seventy-three for croup, and five

for laryngeal phthisis, with the loss in one instance only of life during the operation. They give a number of successful results from tracheotomy.

This would be the proper place for indicating the best preventive measures against so formidable, and, of late years, so frequent a disease among us as chronic laryngitis. The immediate and exciting cause in most of those members of the different learned professions, law and divinity, who have been sufferers from it, is, no doubt, undue exercise of the voice: but as we meet with the disease in persons who are not exposed in this way, and since, as I have already remarked, there is often no proportion between the repeated strain of the voice for a length of time and the frequency and violence of chronic laryngitis, we ought to look out for other causes, as well predisposing as exciting, beyond the one commonly regarded as the chief cause. We are, as yet, wanting in the requisite statistical data for a proper knowledge of the proportions of the members of different professions and callings affected with the disease. So far as medical observation and popular belief guide us in forming an opinion, clergymen are most liable to it. As far as they are concerned, then, our investigation should be directed to an inquiry into — 1, the temperament which we may suppose would be most frequently met with in those whose early bias is to serious and religious reflections; 2, the bodily constitution and collegiate habits of students for the ministry; 3, the kind of labour and exposure either voluntarily entered into by, or exacted from these young men after they have assumed the office and reponsibilities of the ministry. It will be found, I believe, on a review of the facts under their several heads, that a youth of a nervous temperament and feeble constitution, is exposed while at college, or when pursuing his theological studies elsewhere, to the enfeebling influences of deficient exercise; confinement in illy-ventilated halls and dormitories; study beyond measure, and at late hours in the night; anxiety of mind, both as respects his preparation for the solemn part which he is destined to perform, and his worldly success: habits of sensual indulgence, such as the use of tobacco and other means of enfeebling the nervous system. It is easy to see how badly such a person is prepared for the unremitting toil to which, partly from duty, partly from sectarian rivalry, and in no small degree also from the urgent and often unreasonable calls, exactions, in fact, by the inconsiderately zealous of his congregation, he is subjected, so soon as he accepts a call to a church. Preaching often on Sunday and not seldom during the week in close churches, and in the evening too, and in a pitch of voice beyond his natural one, would of itself bring on laryngeal disease in a person already feeble and unable to exercise any organ much without inducing phlogosis and its consequences. But when to this cause we add exposure to frequent and sudden transitions from a dry and hot to a moist and cold air, as when leaving his own home to visit the sick, and, still more,

to attend and officiate bareheaded at funerals, in the midst sometimes of a storm of wind and rain, or of snow; and when he passes from a crowded church, in which he has been perspiring, to the open and chilling air of a cold night, we cease to wonder that the preacher should suffer from diseases of the lungs and air-passages, and especially of that part, the larynx, which has been enfeebled by prolonged and violent exercise, and is, in consequence, peculiarly predisposed to disease.

The prophylaxis of chronic laryngitis should consist in an early attention, on the part of the professional student, to all the agencies counteracting to those which bring on the disease. These preventive measures should be much exercise in the open air, a regular training of the vocal apparatus by both methodical speech and even song, so as to accustom the voice to every variety of pitch and intonation; and to husband its strength, if it be naturally weak, by acquiring the habit of distinct and expressive articulation and enunciation. By uniting the two kinds of gymnastic exercise—that of the muscles of the body and limbs generally, and that of the muscles of the voice—the student will be both fitted to discharge his subsequent duties and less liable to catarrhal and anginose affections. He will enter on the duties of his ministry with some bodily vigour, and with habits of exercise, which he will feel a pleasure, as it will be his duty, to continue. When prevented by inclement weather from taking exercise out of doors, he will have recourse to the use of the dumb-bells and the parallel bars at home. Nor should he omit to keep his vocal organs in the proper tone during the week, in order that he may without fatigue, certainly without injury, task them on Sundays. For this purpose he will not only read aloud but declaim, and vary his tone and inflections, so as to give himself a wide range of vocal utterance, and yet distinctness and power within this range. Deviation from healthy digestion, and particularly if associated with uneasiness in any part of the throat, should be early attended to and corrected; and a relaxation of the tissue lining the fauces and pharynx and investing the soft palate and tonsils, removed by astringents, or even a slight cauterization in the manner already described. Among the hardening measures, is the use of the tepid bath, or sponging the surface of the body, and particularly the surface of the chest, daily, with cold salt and water. The throat should be well gargled at rising, and after every meal, and, at any rate, the whole neck washed in the morning with cold water. No ligature, or tight cravat, or stock should be worn—nothing, in fact, which exerts a compression on the neck, or invites more blood to the part.

Many of the above hints are applicable to the members of the bar, and to all public speakers who would strengthen their physical powers of utterance, and avoid disease of the vocal apparatus.

As any sudden change of temperature of the air which is inhaled is prejudicial to the invalid suffering under chronic laryngitis, he is recommended, when about to pass out from a warm room into the external air, to place a silk handkerchief, or some kind of network before his mouth and nostrils. There has lately been made in

England an apparatus called. "*Jeffray's Respirator*," which is preferable to a handkerchief, or any similar contrivance. It consists of a number of layers of delicate wire-net, secured on each side by morocco leather, and straps or strings so as to allow of its being tied to the back of the neck, whilst the person breathes through the wire-net; inhaling an air, which by the time it has reached his mouth, and certainly his larynx, is of a suitably elevated temperature. I am acquainted with the case of a lady, who, whilst suffering under catarrh, was kept awake half the night with a troublesome cough, which was speedily arrested, and she allowed to sleep undisturbed, after she had put on the respirator at her husband's suggestion. Transition from a cold to a hot air is even still more injurious than the one from hot to cold; and hence the respirator should be kept on for a while after coming in from the outer air.

A more permanent amelioration is obtained by a change of climate. With this view, a residence for a year or more in warmer latitudes, or sometimes during the winter months only, is recommended to patients with chronic laryngitis as well as to those with chronic bronchitis. Where circumstances prevent their absenting themselves from home, an artificial climate may be procured by keeping up a uniform temperature and moisture in the house; and the patient confining himself to it during the whole of the winter. But before having recourse to a change of climate, the patient should be freed from any inflammation of the air-passages under which he may be labouring at the time; for, without suitable precaution on this score, he will be more likely to be injured than benefited by leaving home, and exposed to the operation of causes in travelling which tend to aggravate the inflammation.

Another important consideration is the state of the digestive organs. There is hardly any morbid association more common than that of irritation of the bronchial and laryngeo-bronchial membrane with a similar irritation of the stomach; especially after the middle period of life. In cases of this kind, it is well remarked by Sir James Clark; "upon tracing the progress of the disease, we shall generally find that the bronchial affection, the liability 'to catch cold,' the 'spring cough,' the troublesome morning phlegm, &c., did not occur till the patient had suffered for some time, often for years, from symptoms of disordered digestive organs. When this is the case we shall make little progress in the case of laryngeal and tracheal diseases until we have subdued the irritation of the digestive organs; and the hopes of the successful issue of our treatment, must, therefore, rest chiefly on the facility with which this yields to our remedial measures."

This remark may be usefully extended to nearly all chronic diseases, over which the stomach, in its different conditions, displays so great and, at times, extraordinary an influence, as to induce those who are not patient and attentive in diagnosis, to attribute the constitutional disturbances caused by lesions in other organs, and notably in the lungs, heart, and even brain, to gastric origin.

LECTURE LXII.

DR. BELL.

BRONCHITIS. — Its complications with other diseases—Catarrh, a prelude to more serious disease—Importance of early attention to it—Outlines of treatment of catarrh—The dry method of Dr. Williams.—Bronchitis,—its divisions—The kind showing itself in young children—Asthenic variety, or peripneumonia notha—Duration of *acute* bronchitis—Symptoms,—appearance of the sputum —Physical signs—Percussion, indirectly useful—Touch giving a sense of vibration—Auscultation—Modifications of sound, produced by inflamed and obstructed bronchia—Division of sounds in respiration, indicating diseases of the lungs—Meaning attached to the terms *rhonchus*, *sibilus*, and *crepitations*—Specification of sound according to the portion of bronchia diseased.

BRONCHITIS.—ACUTE MUCOUS CATARRH.—INFLAMMATORY CATARRHAL FEVER. — This disease has only been separated from inflammation of the lungs of late years. We are indebted to Dr. Badham of Glasgow for being the first to perform this service to the profession and to humanity, and for pointing out its nature and seat, in a small work published by him on bronchial inflammation. After him, Dr. Hastings has since contributed largely to fix attention on the disease, and to introduce it formally under the title of *bronchitis*. In varying degrees of intensity, inflammation of the bronchial mucous membrane is met with in neglected catarrh; or it comes on primarily after the inhalation of irritating gases or poisons; or as an occasional and always alarming complication in remittent and typhous fevers, in the exanthematæ generally; but more especially in measles and small-pox; also in gout and rheumatism, and in hooping-cough, asthma, pneumonia, phthisis pulmonalis, pleurisy, and carditis. In sympathetic relation with all the membranes of the body, and more particularly with other divisions of mucous membrane, the bronchial portion is liable to inflammation, not only after laryngitis and tracheitis, but after gastritis and gastro-enteritis and diseases of the skin, both acute and chronic. Bronchitis frequently occurs in an epidemic form, under the popular title of *influenza* or *grippe*. In some situations it may be said to prevail endemically, as at the Children's Hospital in Paris. A common cough, catarrh, or cold in the breast, is a mild form of bronchitis.

All ages are subject to this disease, which may even be congenital. Children in our climate are found to be particularly liable to it, and in some seasons are its chief victims. With us, also, the complication of bronchitis with hepatic and gastro-intestinal derangement is frequent; more so probably than the union of pneumonia or of pleurisy with disorder of the liver, designated as bilious pleurisy.

Bronchitis is commonly ushered in with catarrh, the precedent of which again is frequently *coryza*, or cold in the head. The first stage consists in simple irritation of the mucous surface of the eyes

and nostrils, which is soon spread to the fauces, and is manifested by an increased secretion, chiefly of a serous fluid; sneezing, and some soreness of the throat. The irritation extending to the trachea and bronchia, there is a tickling cough, with an expectoration of mixed serum and mucus. At this stage the disorder sometimes ceases, and the individual is said to have soon got over his cold. But, under other circumstances, there is not simply an irritation of the mucous membrane and glands of the bronchia, but a positive inflammation of these parts, and a train of associated symptoms which indicate great distress in the respiratory apparatus, as they do real danger to the life of the patient. Sometimes the affection of the bronchia shows itself without any prior irritation of the Schneiderian membrane, fauces, and tonsils; and this is more apt to be the case in delicate persons, or in those predisposed to coughs and pulmonary disease.

A few remarks on catarrh, or a common cold, as it is familiarly called, will properly precede a notice of bronchitis in its more aggravated varieties. If the commonness of a thing were to render men indifferent to its presence, the people of the East ought not to care for the plague, nor those of the West Indies for the yellow fever; but, still, these diseases are avowedly worthy of study, and serious enough to be avoided if possible. I will not say that colds are to the inhabitants of our climate what plague and yellow fever are to those of other countries; but I can aver confidently that they usher in diseases of greater complexity and mortality than these latter. The common accompaniments of a cold, viz., toothache, earache, headache, weak and watery eyes, sore throat, rheumatic pains, indigestion, and renal disorders, are quite numerous and disagreeable enough to entitle it to a very respectful notice, and much more considerate treatment than it usually receives. If to these annoyances we add the danger from bronchitis and pneumonia, which often follow in the train of a neglected cold and from phthisis pulmonalis, the tubercular irritation of which is developed by the same cause, we surely have proof and argument enough for attention not only to the preventive means, but also to the curative ones of a disease, which, however mild in its inception, is directly or indirectly productive of such diversified and alarming results. More particularly should this lesson be impressed on those who, in consequence of prior attacks of bronchitis, or of constitutional tendency to pulmonary consumption, are in the greatest danger from every fresh cold. They, at least, can ill afford to make the hazardous experiments of nursing and sweating themselves one part of the twenty-four hours, and of exposing and chilling themselves during the remainder, as we every now and then find persons with catarrh to do.

If time be of value to him, 'who has caught a bad cold,' it is the more incumbent on him to act promptly in the premises, by his submitting at once, and with a good grace, to the adoption of suitable measures for his relief. These will be, quiet in an air of an equable and rather warm temperature, abstinence from animal food and all

stimulating drinks whatever, and in their stead a moderate portion of vegetable matters and simple demulcents. Under the head of medicine will come a brisk purgative, mercurial or saline, according either to the prior experience of the person himself, or to the state of his digestion and the activity of his circulation. If there be indigestion, a foul tongue, and turbid urine, let him have a dose of calomel and jalap, or of calomel and rhubarb; if his habit be plethoric, he should take salts. After evacuation procured by this means, if the cough harass and is aggravated by the thin serous secretion from the trachea and bronchia, an opium pill of one to two grains, or twenty to forty drops of laudanum; or Dover's powder in five-grain doses, repeated two or three times at intervals of four hours; or laudanum with antimonial wine will come in appropriately enough, and not unfrequently relieve all the troublesome symptoms, including pains in the limbs. The headache frequently left by the opium is carried off by a dose of magnesia, or eight or ten grains of carbonate of ammonia, or a teaspoonful of spirits of hartshorn in water. When the stomach is in a healthy state and the bowels free, a full dose of opium often cuts short a cold, and will therefore arrest at once a mild bronchitis. If the cough, however, still continues after the above remedies have been used, recourse is generally had to various formulas of cough mixtures, the active basis of which is either ipecacuanha or antimony, and less frequently squills, with opium in some form or another. My own experience has taught me, that the simpler these formulas are the better; antimony (tartar emetic) entering in larger proportion, if there be a tendency to inflammatory action, — ipecacuanha if there be gastric complication, and opium if the skin is cool, or the temperature of the surface unequal, and the cough is accompanied with thin expectoration, come on in fits, and is readily excited through the nervous system alone. I can add, with great confidence also, my own testimony, in confirmation of the favourable opinion of others, to the value of the alkalies in simple catarrh, as well as in the more advanced stages of confirmed bronchitis. Wine of ipecacuanha, sub-carbonate of potassa and laudanum in suitable proportions, mixed with simple syrup and water, make a cough mixture, to which, especially in the cases of children's catarrh, I am not a little attached. In the more asthenic forms, twenty to thirty drops, for an adult, of the aromatic spirit of ammonia will be properly substituted for the carbonates of potassa and soda. The physician who has tried the alkaline remedies will join Dr. Williams in opinion, — that they quiet the cough and promote expectoration far better than the oxymels and acid linctus, or lozenges, and I would add syrups of squills, that are commonly in use, and which, however they may appear at the time to "cut the phlegm," and cleanse the throat, tend to disorder the digestive organs, and often ultimately increase the cough. Both with a view of keeping up their influence on the secretion from the bronchia, as well as to their immediate impression on the glottis and the throat, cough medi-

cines should be taken frequently: and during the intervals it is well to sheathe the fauces against irritating secretion, and through continuous sympathy to operate on the upper portion of the air-passages, by having often, if not constantly in the mouth, a piece of gum arabic, or by sipping frequently of thin flaxseed-tea, or some analogous demulcent decoction.

In a class of subjects of catarrh, who are said to be of bilious habit, and also those who are dyspeptic, opium, and the common cough mixtures into which antimony and squills enter, are often prejudicial, and increase the gastric disorder by which the cough is accompanied, and not seldom sustained. For these cases other narcotics are thought to be better adapted, such as the hyosciamus and conium, &c.; which certainly less interfere with the digestive process, and, if combined with rhubarb or the compound extract of colocynth, or, better than all, the blue mass, will be found to answer the double indication of modifying beneficially the secretions of the bronchial and the gastro-intestinal mucous membrane. The alkalies are useful adjuncts in the intervals between the times of taking these combinations or the narcotic extracts alone.

There is another plan of treating a cold, by what its author, Dr. Williams, calls *drying it up*. He first practised it on his own person. Having observed, on being attacked with one of the colds, to which in early life he had been so subject, that taking a quantity of tea or any other liquid, although very comfortable at the time, was invariably followed in the course of an hour by an increased 'stuffing in the head,' and accompanying flow of scalding, irritating humour from the nose and eyes, he determined to try and prevent such exacerbations "by cutting off the supplies — by ceasing to drink. For twenty-four hours," continues Dr. Williams, "I did not take a drop of liquid of any kind; and to my agreeable surprise, not only did I escape these occasional aggravations of the complaint, but the stuffing and discharge began to show evident signs of abatement, and the handkerchief was in less continual requisition. I persevered for twenty-four hours more, and my cold was gone; there being only now and then a little gelatinous, opaque mucus collected in the nostrils and throat, without any stuffing or irritation, just as it takes place at the end of a cold. What was of still more consequence, no cough followed; the whole catarrhal disease seemed to have been destroyed." Dr. Williams has been in the habit of acting on this plan of treatment ever since (twelve or fourteen years ago) under similar circumstances, and has recommended it to a great many friends and patients with a successful issue.

The physiological principle on which the dry method acts, is by a prompt decrease of the mass of circulating fluids, and a diminution of the partial plethora of the vessels supplying the morbid secretion from the affected membrane, which, no longer irritated by its own secretion, is soon restored to a healthy condition. "If liquid be freely taken too soon, before the membrane have lost its diseased action, the discharge will return, and the complaint will be

as bad as ever. But if, after the discharge has been stopped by twenty-four or thirty-six hours of dry diet, means be taken to keep up the other secretions, as by exercise, with a warm state of the surface, a little liquid may be taken with impunity, the bulk of the circulating fluid being still below the point at which it can supply any demands from the irritation in the diseased membrane."

Dr. Williams considers it very essential for the success of the dry treatment, that the cold should be in its early irritative stage, when it generally occupies the nasal and pituitary membrane. "If there be any fever, and especially if the state of the bowels requires it, an aperient with an antimonial should be given, for this favours that free state of the secretions on which, as we have seen, the efficacy of the dry plan depends. In milder cases, however, this is not necessary. For the same reason it is expedient that the solid food be not of a too rich or heating kind; for this, undiluted by liquid, might be apt to disagree. Bread, or any consistent farinaceous food, with a little butter, vegetables, white fish, and white or gelatinous meats, light puddings and dried fruits, will do very well for a dry diet; and who can call this starving." Sometimes the diet need not be changed in any particular, except on the point of abstinence from liquids; and even in this latter respect, Dr. W. has lately found that a deviation to the amount of taking about a tablespoonful of tea or milk, with breakfast and the evening meal, and a wine-glassful of water on going to bed, does not interfere with the success of the plan, and it certainly adds to one's comfort. A great advantage of this plan is in its not preventing a continuance of one's ordinary pursuits: it needs no nursing or confinement. "In fact, if care be taken to clothe enough to prevent the surface from being chilled, exercise in the open air promotes the success of the plan, by promoting the natural secretions.

"On an average, forty-eight hours of abstinence from liquids will be quite enough to effect a cure. The period may be shortened by exercise and warm clothing, or laying warm in bed, or by commencing with a purgative, or by any other dry means of increasing the natural secretions" (*Lectures on the Physiology and Pathology of the Chest*).

Bronchitis in its intense and severer forms differs from the milder kind, mainly in the greater extent of the bronchial tubes which the inflammation occupies. It has on this account been studied under the two heads of *tubular* and *vesicular*. Tubular bronchitis is inflammation of the bronchial membrane lining the larger and middle sized tubes, or wherever it lines tubes, properly so called. Vesicular or pulmonic bronchitis is that variety in which the mucous membrane lining the air-cells of the lungs is inflamed. Something, also, will depend on the intensity of the phlogosis, even on an equal surface. Like all the phlegmasiæ, bronchitis exhibits an acute and a chronic form. The first again is appropriately divided into the *sthenic* and the *asthenic* varieties.

Symptoms. — In sthenic bronchitis, inflammatory symptoms are evident from the commencement. After the preliminary stage of simple coryza, already mentioned, or, sometimes, without any notification of this kind, the patient suffers from pain and a feeling of tightness across the sternum, dry hard cough, without expectoration, or with the discharge in this way of glutinous mucus combined with frothy serum, sometimes coloured with blood. The chills, with which these symptoms are ushered in, soon alternate with increased heat and dryness of the skin, and are followed by quickened and somewhat laboured breathing and dyspnœa, and sometimes a dull pain at the sternum on coughing; tongue white with red borders; pulse quick and full, and at times hard; pain in the forehead, back, and limbs; constipation, and scanty, high-coloured urine. As the disease advances, the cough becomes more troublesome, and in its paroxysms causes redness of the face, watery eyes, and a feeling of pain in the hypochondria along the false ribs, in the back, and at the lower part of the sternum; in fine, in the course of all the attachments of the diaphragm manifesting extension of the inflammation to the vesicles. The cough is generally excited at each full inspiration; as, also, by speaking, or the mere act of drinking, or a simple change of posture; and it is sometimes productive of nausea and vomiting. Pain in the course of the trachea and the bronchia, as felt under the sternum, and in what is called soreness of the chest, is not a constant symptom. Sometimes it is slight, and the patient complains of a troublesome heat diffused through the chest, and a tickling in the trachea.

There is an aggravation of the symptoms towards night, which is generally sleepless and disturbed. The common posture is on the back; but it is often changed. If there be not relief by expectoration or perspiration, or by prompt remedial measures, bronchitis shows a change of character. Feelings of great depression are complained of; the pulse becomes weak as well as quick; the brain is disturbed in its functions, and the muscular strength is much reduced: the countenance, from being often flushed, becomes anxious and pallid, or partially livid, according to the quantity of blood in the system; the pulmonary congestion becomes evident by a slightly diminished resonance on percussion in the postero-inferior regions of the chest. The secretions are scanty and vitiated; the tongue is loaded with a brown fur; the thirst is intense. Cerebral and abdominal congestions may also occur, and dropsical swellings are no unfrequent result. The transition from this stage to death is soon made, especially in those cases which have been neglected from the outset. A remarkable feature in the character of the worst form of bronchitis is, the rapidity with which the collapse and symptoms of extreme prostration and debility succeed to high fever, and well marked local excitement. The whole course of these fatal cases is sometimes wonderfully rapid, death ensuing within two days from the commencement of the attack. They are commonly con-

founded with pneumonic inflammation, and are scarcely to be distinguished from it during life, but by the physical signs. The severest form of bronchitis is, however, more formidable and rapid in its course than pneumonia itself.

Another form of bronchitis than that just described presents itself in *young children*, to whom it often proves fatal. Its beginning, says Dr. Williams, is very insidious, in its assuming the aspect of a common catarrh with coryza, but without pain, much fever, or derangement of the general health. An attentive observation, however, will discover a frequency and wheezing in the breathing which is uncommon, particularly before and after fits of coughing; and the paleness of the countenance and depression of the child's spirits indicate something more than a common cold. The cough is not always present, so that this symptom does not indicate the extent of the disease; and as children do not expectorate, the thoracic derangements may escape notice, until the coming on of dyspnœa shows the imminency of the danger. At this time the pulse becomes very quick, and the severity of the attack is evinced by the disturbance of the respiration and circulation. There may be a remission for a time, in which the child remains in a somnolent state without much cough or quickness of pulse: but if the breathing still continues quick, the dyspnœa returns after a while with increased severity, accompanied by a greatly quickened pulse; stupor comes on, the lips become livid, and in this or some similar exacerbation the child dies suffocated.

Inflammation of the bronchia may exist in newly-born infants, without producing any well marked symptoms. Billard (Dr. Stewart's Translation, 1839,) states, his having in four instances seen the remote ramifications of the bronchia very red and filled with thickened mucosities in children, in whom, during life, there had not been either rhonchus or cough. In two there was pneumonia with pulmonary engorgement; in two others the lungs were healthy, and death occurred from intestinal inflammation.

When bronchitis supervenes on pneumonia (vesicular bronchitis), the smaller divisions of the bronchia are the parts inflamed. Bronchial catarrh will sometimes give rise to all the symptoms of suffocating catarrh, which are regarded as the result of an infiltration of serosity in the pulmonary tissue.

The *asthenic* form of bronchitis bears more analogy to the variety just described than to simple acute or sthenic bronchitis. It has commonly been called *Peripneumonia Notha*, or spurious inflammation of the lungs, and sometimes bastard pleurisy, and by Laennec, *Acute Suffocative Catarrh*. One of its earliest and characteristic symptoms is oppression of breathing, and a peculiar wheezing; but it has less of the inflammatory type than the first form. The pulse is small, quick, or irregular, and with little or no increase of heat except at night; the tongue foul and loaded; urine scanty; extremities cold; headache; exacerbations of dyspnœa so

severe as to prevent the patient from lying down, and accompanied by extinction of the voice. The expectoration, at first scanty, becomes afterwards very copious and frothy. These are the chief symptoms of the disease as it occurs in the persons who are most liable to its attacks, viz., the aged and infirm, and those weakened by prior diseases and excesses. The duration of this form is commonly longer than that of the other or sthenic, and it has a much greater tendency to pass into the chronic form. Persons liable to pituitous catarrh, or who have habitually a cough with copious thin expectoration, generally suffer in this way when attacked by bronchitis.

Acute sthenic bronchitis will vary in its duration from one to two weeks. In favourable cases the disease declines between the fifth and eighth days.

The appearance of the sputum, if not the chief characteristic of acute bronchitis, as some regard it, is unquestionably of such importance as to require our early and continued attention to its successive changes. In the early stage the secretion from the bronchia is either wanting, and then the cough is dry and hard, or it is scanty, and consists of a sero-mucous fluid, transparent and viscid. If poured out from one vessel to another, it flows out in one mass of extreme tenacity, — drawing out sometimes like melted glass; and the degree of viscosity is a tolerably accurate measure of the degree of the existing inflammation. Upon the surface of the viscid mucus there is usually more or less froth, the quantity of it depending on the facility or the difficulty with which the sputa are brought up; becoming, as the disease advances, more opaque, more abundant, and less tenacious; and at the period when the inflammatory fever ceases, and is either succeeded by an apyrexial state, or by a hectic, we observe a remarkable change in its character. It becomes thick, and has considerable consistence; or it may pass into the muco-puriform state, and exhibit masses of a greenish-yellow colour, quite opaque, and, though somewhat viscid, yet flowing altogether. For valuable specifications of the appearances and other characters of expectorated matter in bronchitis, I would refer to the comprehensive section on this disease by Dr. Stokes, in his excellent *Treatise on the Diagnosis and Treatment of Diseases of the Chest.* I will merely give now his divisions of the secretions from the bronchial mucous membrane, when in a state of irritation. These are, 1, Transparent mucous secretions; 2, Opaque mucous or albuminous secretions; this again subdivided into the amorphous, and moulded to the form of the tubes; 3, Muco-puriform secretions; 4, Puriform secretions; 5, Serous secretions.

Much light is thrown on the pathology of bronchitis by the PHYSICAL SIGNS. They are derived, first, from percussion; second, from the touch: third, from auscultation.

As regards percussion, it is admitted, very generally, that it furnishes no direct sign in the present case; the sound on striking the chest being almost always of a natural clearness. There is but

a single case in which simple bronchitis is even attended with decided dulness, and that is, one in which a vast secretion of mucus or muco-purulent fluid exists in the bronchial tubes; but, continues Dr. Stokes, who makes this remark, such a case is extremely rare, for a large proportion of the bronchial tubes may contain quantities of secretion, and yet the sound on percussion shall continue without any perceptible diminution. When, however, the disease is combined with affections which have their seat in the areolar or parenchymatous structure of the lung, such as œdema, congestion, pneumonia, or tubercle, the results are of course different, the extent and situation of dulness varying according to circumstances.

Yet, as Dr. Stokes properly remarks, although percussion gives no direct result in bronchitis, its employment is of importance in the particular diagnosis. Thus, suppose that after the existence for three or four days of fever, cough, hurried and difficult breathing, the chest still sounds well, the great probability is, that the disease is bronchitis. The patient has had an acute inflammatory affection of the lung, and but of a few days' standing: this must be either bronchitis, disease of the serous membrane, or of the parenchymatous tissue itself. Here the absence of dulness guides materially our judgment; for were the case one of pleuritic effusion, or of disease of the substance of the lung, the great probability is, that by this time a degree of dulness would be manifested; in the one case the lung would be compressed, and its place occupied by liquid effusion; in another, more or less obliteration of the air-cells would take place, from congestion, or from inflammation. *The absence, then, of dulness, with the existence of acute irritation of the lungs, which has continued for several days, forms an important argument that the case is one of uncomplicated bronchitis.*

From the knowledge of the fact, continues the able writer already quoted, that in simple bronchitis there is nothing to produce a perceptible dulness of sound, we derive a most important assistance in the diagnosis of tubercular development, whether in the acute or chronic form. The value of this will be seen when we consider the frequent similarity of symptoms between the disease of tubercular phthisis and bronchitis, a similarity easily understood, when we recollect that in most cases of tubercular development there is a coexisting catarrh. But, as will be shown hereafter, the occurrence of a partial, or general and progressive dulness, in a case presenting the symptoms of bronchial inflammation, is one of the principal circumstances on which the diagnosis of tubercle depends.

The sense of touch guides us in forming a diagnosis in bronchitis, by the transmission of a distinct vibration when the hand is laid on the thorax. This sensation can be detected both during inspiration and expiration, but is generally more perceptible in the former than in the latter; and more in the child and female than the adult male. The vibration is much more distinct in the middle and inferior than

in the upper portions of the lung: it is not met with in simple pleurisy or pneumonia. In pleurisy, however, a sensation of rubbing may occur; but it is that of two continuous, though roughened surfaces, moving one upon another; whilst the bronchial vibration gives the perception of air passing in many directions through an adhesive fluid.

The application of the *auscultation* test is happily introduced by Dr. Williams (*Cyclop. of Pract. Med.*); and the subject is more fully explained in his *Lectures on the Physiology and Diseases of the Chest* — Philadelphia Edit. We may premise, that the purring, rattling, or wheezing sound, which accompanies breathing in bronchitis, may be heard by applying the ear to the patient's mouth. Inflammation of the mucous membrane of the bronchia at first causes tumefaction, and consequently a diminution of the calibre of the tubes. This occurring in individual points so modifies the passage of the air through them, that, as in a musical instrument, a sound is produced. This sound varies according to the form of the constriction and size of the tube; but the general effect is, that on applying the ear directly to the chest, or mediately by means of the stethoscope, we find the ordinary respiratory murmur accompanied by various whistling and wheezing sounds. These occasionally present a graver tone, like the prolonged note of a violincello, or the cooing of a dove; and they indicate that some of the large bronchia are the seat of disease. To such modifications of the respiratory sound, M. Laennec gave the names of *sibilant râle*, *rhonchus*, or rattle, and *sonorous râle* or *rhonchus*. These constitute the dry sounds, and are the symptoms of the earliest stage of bronchitis, and are often perceptible, especially during expiration, before the patient is aware of any suffering in the chest. They prove, moreover, the fact, supposed by Dr. Badham, and doubted by Dr. Hastings, that the dyspnœa of the early stage of bronchitis is caused rather by the state of the mucous membrane than by the redundancy of its secretion. Both the co-arctation of the tubes by which air is scantily admitted, and the general thickening of the membrane by which the oxygenation of the blood is interrupted, appear to be the physical or pathological causes of the symptom in question — the rhonchus. This is a generic term, applicable to all those sounds which are produced by an increased resistance to the air moving through the lungs. Dr. Williams divides them into the *dry* and the *humid*, according as the impediments that produce them are solid or liquid. Of the dry rhonchi there is the *sibilant* or *whistling* rhonchus, which is sufficiently described by its name, and may be generally imitated by whistling between the teeth. The *sonorous* rhonchus is a snoring, humming, or drawing sound, and may vary, in loudness and key, from an acute note like that of a gnat down to the grave tone of a violencello or bassoon. There is another rhonchus which Dr. Williams calls the *dry mucous*, because it is produced by a pellet of tough mucus obstructing a tube, and yielding to the air only in successive jerks, which cause

a ticking sound, like that of a click-wheel. Dr. Williams very properly adds: "Now, as any of these rhonchi may be produced in only one tube, and yet make a great deal of noise, you are not to suppose that they are important in proportion to the noise they make. It is rather when they are very permanent, or when several of them are heard at once in different parts of the lungs, that they bespeak disorder which may be serious, either from its permanency or its extent."

The humid rhonchi all depend on the passage of air, or bubbles, through a liquid in the lungs, and their species are produced by differences in the size of the tubes and the nature and quantity of the liquid which cause varieties in the bubbling sound. The mucous rhonchus may be heard in the large and smaller bronchia down to the size of a crow's-quill, and in these different situations its gurgling or crackling presents different degrees of coarseness. When the bronchial tubes become unnaturally enlarged by disease, or when morbid cavities are formed by the destruction of portions of lung, the bubbling of air through liquid in these is of the coarsest kind; it is quite *gurgling*, and if the liquid be scanty, has a hollow character, and is called the *cavernous* rhonchus.

A roughness added to the ordinary respiratory murmur, or the bubbling or crackling, owing to a little liquid in the smaller bronchia, constitutes the *sub-mucous* rhonchus. It may result from slight degrees of bronchitis, and owes its importance only to its being permanently present when such slight inflammation is constantly kept up, by the irritation of adjacent tubercles in an incipient state. More liquid, but not of a viscid kind, in the smallest tubes and terminal cells, gives the rhonchus a still more crepitating character, resembling that heard when the ear is applied near the surface of a liquid slightly effervescing, such as bottled cider or champagne. This is the sub-crepitant rhonchus which is heard in œdema of the lungs, humid bronchitis, and other affections in which liquid and air occupy the extreme tubes, and are forced through each other in the motions of breathing. But the most perfect and equal crepitation is that of peripneumony, called the *crepitation* rhonchus. It exactly resembles the sound which you can produce by rubbing slowly and firmly between your finger and thumb a lock of hair near your ear.

I like the way in which Dr. Watson describes the phenomena revealed by auscultation, applied to bronchitis; and in place of attempting a mosaic picture, made up of detached parts from different auscultators, I shall give you his own representation. I will just premise, however, that he, like Dr. Latham (*Lectures on Clinical Medicine*, Philad. Edit.), divides the sounds referrible to diseased lungs, whether in breathing, speaking, or coughing, into the two genera, viz., the *dry* and the *moist*. The first, or the dry sounds, are represented by the terms *rhonchus* and *sibilus;* and the second, or moist sounds, by the term *crepitation*. Rhonchus is the larger and hoarse sound, proceeding from the bronchia in their first divisions; sibilus the

smaller and shriller, caused by the minute bronchial ramifications or the vesicular structure of the lungs. Crepitations in this disease correspond with the moist rhonchi and their species, or other divisions which, you will remember, included also different crepitations.

"When you listen, I repeat, to the breathing of a healthy person, you hear, as the breath goes in and out, but especially as it goes in, a smooth and gentle rustle — the *respiratory murmur*, or the *vesicular breathing*. But when the inner surface of the bronchial tubes, and of their ramifications, is preternaturally dry, and tumid, this sound is altered: you hear a hissing, or wheezing, or whistling, as the breath goes in and out; and this is technically called *sibilus:* or you hear a deeper note, a snoring noise, as the patient inspires or expires — a sound like the cooing of a pigeon, or the bass note of a violin, or the droning hum of an insect in its flight; and this is called *rhonchus*. These two, in their various modifications, constitute the *dry* sounds of respiration; and it will be worth while, once for all, to reflect upon their cause and nature, and the manner in which they are combined, and what they denote. You are aware that when air is propelled through a cylindrical tube of a certain size, and when that tube is narrowed in a particular way at one or more points, a musical note is produced. Now this is what often happens in the larger bronchi; this is what *always* happens in them when *rhonchus* is present. Rhonchus belongs to the larger divisions of the bronchi exclusively; and as these are often, for a time, exclusively affected, so rhonchus may exist *alone*. It will be grave or deep in proportion to the length and diameter of the tube in which it is produced. When the sound *is* grave and deep, the hand placed upon the chest may frequently perceive a trembling or thrill communicated to its parietes. I believe that rhonchus is mostly occasioned by portions of viscid, half-solid mucus, which adhere to the membrane, and cause a virtual constriction of the air-tubes, and act as vibrating tongues while the air passes by them. I conclude such to be the case, because it seldom happens that the rhonchus cannot be got rid of by a vigorous cough. It will soon begin again, perhaps, or it will commence in some other part, but the effort of coughing, which detaches and removes the adhering tough mucus, dislodges also, for the time, the rhonchus. Yet, rhonchus in a given spot may be permanent: a tumour, or a tubercle, may flatten one of the air-tubes, and convert it into a musical instrument. For the most part, you will find what I have told you holds true: you may suspend the rhonchus by getting the patient to make a hearty cough. Now in the natural state of the chest, we do not, except in particular spots, hear the transit of the air through the larger bronchi. Whatever sound it makes is damped by the spongy lung, or covered by the vesicular breathing. But rhonchus, in its turn, may overpower the vesicular murmur, and render it inaudible. It does not prevent it, but it outroars it, as it were. Yet this is seldom the case: you hear the rhonchus, and, if you

listen attentively, you may in general hear, mingling with it, the vesicular murmur also. Recollect, then, that rhonchus belongs to the larger divisions of the air-tubes; that it denotes their partial narrowing; that it is a dry sound; and that the condition of which it is expressive implies usually no danger: there is no material obstacle to the passage of the air through these larger tubes to the vesicular structure beyond them.

"I must further admonish you, that in your earlier essays in auscultation you will be apt to deceive yourselves in respect to the exact place in the lung in which the rhonchus which you hear is produced. It is so loud a sound, that when it proceeds from a single bronchial tube it may be plainly audible over the whole of that side of the chest; and sometimes, more obscurely, over the other side too.

"When air is driven with a certain degree of velocity through a small pipe, it gives rise to a hissing noise. It is by forcing air through a cylinder perforated by a slender tube, that Professor Wheatstone obtains the sound of the letter S in the talking machine which he has constructed, after Kempelin's model. Precisely this condition we have in the smaller bronchial ramifications, when the inflammation in catarrh or bronchitis has reached *them*, and rendered the membrane lining *them* tumid. And sibilus is the result of this change. Now sibilus, like rhonchus, may exist alone; and, inasmuch as the sibilus proceeds from the smaller air-tubes, adjacent to the pulmonary vesicles, it *abolishes* the natural respiratory murmur. It does not, like simple rhonchus, merely drown it, but it takes its place. If you do hear the respiratory murmur mingling with sibilus, you may be sure that some of the lesser air-tubes are narrowed, and some free: you cannot have both sounds at once from the same ramifications of the bronchi. Sibilus is a sound of more serious import, therefore, than rhonchus; it bespeaks a condition of greater danger. It belongs to the smaller air-tubes and vesicles, and denotes that they are in the first stage of inflammation, which has diminished their natural calibre, by rendering the membrane tumid. It is a dry sound, but you cannot cough it away.

"I say rhonchus may occur alone, and sibilus may occur alone; but very often indeed they both occur together; and may be heard in various parts in different degrees: causing a strange medley of groaning, and cooing, and chirping, and whistling, and hissing, mixed, it may be, here and there, with the natural respiratory murmur. When you hear sibilus over the entire surface of the chest, the mucous membrane is universally affected, and the case is a severe one, and attended with considerable hazard.

"It is just possible that a sibilant sound may proceed from a large air-tube, when its bore has been narrowed to a very minute slit or orifice; but this possibility does not interfere with the general distinctions that I have been endeavouring to point out.

"Now, in these cases we neither obtain nor require any informa-

tion from percussion, except of a negative kind. Supposing the inflammation confined to the mucous membrane, the resonance on percussion will not be sensibly diminished; the lung is everywhere spongy still, and air reaches every part of it, though not with the usual freedom.

"There is one exception to this. Occasionally, though rarely, a piece of tough phlegm may seal up, as it were, the very entrance of one of the principal bronchial tubes, and so prevent the air from passing to or from the portion of lung to which that tube conducts. When this happens, it is very likely to puzzle the auscultator for a time. There is air in the sealed up portion of lung, therefore percussion gives a natural sound; but the air is at rest, therefore no sound of respiration is audible. An effort of coughing unstops, perhaps, the bronchial tube; and then the air is again heard to enter and to depart from that portion of lung. I shall advert to this sort of accident again.

"Finally, I may remark, that these dry sounds, rhonchus and sibilus, are heard during the *breathing;* they have no relation to the voice or to the cough.

"After a while the inflamed membrane begins again to pour out fluid; but it is not the thin, bland, moderate exhalation of health; it is a glairy, saltish, transparent liquid, like white of egg somewhat; and if it be expectorated only after much coughing, it will be frothy also, *i. e.*, it will contain many bubbles of air entangled in it. It is a stringy, tenacious fluid, and the more so in proportion to the intensity of the inflammation. With this new condition of the membrane, we have new sounds — sounds which result from the passage of air through a liquid; sounds which are occasioned by the formation and bursting, in rapid succession, of numerous little air-bubbles. These sounds are called *crepitations.* This process may take place in the larger air-tubes, or it may take place in the smaller, or in both. In the larger tubes the *bubbles* will be larger, and the ear can readily distinguish this; we have *large crepitation.* In the smaller air-tubes we have, in the same way, *small crepitation.* There is no difference between these sounds except in degree; and they graduate insensibly into each other. But there is a considerable difference in the nature of the intimations which their well-marked varieties convey. If there be merely large crepitation, without any other morbid sound, it is produced in the larger tubes. Air passes, notwithstanding, into the vesicular structure *beyond* the accumulated liquid; and vesicular breathing *exists,* though perhaps it *cannot be heard,* on account of the crepitation. But the state of the patient is not a state of peril. On the other hand, small crepitation has its seat in the smaller air-tubes and cells; it supersedes the vesicular breathing, and, if extensive, it bespeaks considerable danger.

"Rhonchus and large crepitation are respectively the dry and moist sounds that belong to the larger bronchi; sibilus and small crepitation the dry and moist sounds of the smaller branches.

When the latter sounds are heard over a considerable part of the chest, there is, I say, usually a good deal of distress, dyspnœa, and cough; and the fever which attends the local inflammation is at its height. By and by, the expectoration becomes opaque, and more consistent, and of a greenish or yellowish colour; it is brought up with more ease; the crepitation, great and small, diminishes; perhaps rhonchus reappears: but at last the parts return to their original condition; and the natural, smooth, equable rustle of the breathing is again everywhere audible.

"These are all the morbid sounds to which active and recent inflammation of the mucous membrane of the air-passages ever gives rise: rhonchus and sibilus; large and small crepitation. Having once described their nature and causes, I need not repeat the description if we find them accompanying other diseases; but their *import* may be different. I may mention here, that as crepitation results from the passage of air amongst and through liquid, from the rupture of the little air-bubbles so produced, the *kind* of liquid may vary. If the air, in going and returning, meets with serum, or with pus, or with blood, it will occasion exactly the same bubbling noise. Hence the French term for what I have been calling crepitation, viz., *mucous rattle*, is very objectionable. From the sound itself, we cannot tell whether it proceeds from *mucus* or from some other liquid present in the air-passages; and from this objection the word crepitation, whatever exception may be taken against it on other accounts, is free."— (*Lectures on the Principles and Practice of Physic.*)

LECTURE LXIII.

DR. BELL.

Morbid Anatomy of Bronchitis.—*Treatment*—Venesection, not to be pushed far—Purgatives—Emetics, of doubtful value in acute bronchitis—Tartar emetic, as a counter-stimulant—Rules for its use—Immediate effects various—Case—The warm bath—pediluvium—Blisters and other counter-irritants to the chest—Calomel in bronchitis complicated with abdominal disease; to which are added opium and ipecacuanha—*Second stage of bronchitis*, with symptoms of debility—Stimulating expectorants useful; carbonate of ammonia, wine whey, senega, acetate of ammonia—Calomel and a few cups, with simulants, for congestion of a part of the lung—Diaphoresis without diaphoretics—Diuretics as antiphlogistics sometimes useful—Secondary or Symptomatic Bronchitis—Complication of bronchitis with various diseases, especially eruptive fevers—*Treatment* by local depletion, counter-irritants, and moderate stimulation—Dr. Copland's plan of external cutaneous revulsion—Emetics—Bronchitis succeeding laryngitis,—Active depletion in.—Hooping-cough—Its connexion with bronchitis—Outlines of treatment—Remittent fever with bronchitis; in the tyyhoid stage—Cooling remedies useful—Depletion and stimulation sometimes necessary at once—Inhalation of watery vapour—Change of posture—Quinia and laudanum, for excessive bronchial secretion—Dr. Graves's practice—Sugar of lead.

Morbid Anatomy of Bronchitis. — More frequently the morbid changes in the bronchia have been found in the bodies of those who

have died of other diseases, during the attack of which they had suffered at the same time from bronchitis. In the mild and recent form of this latter, there is found some redness in a circumscribed portion of the mucous membrane, particularly at the termination of the trachea and the first divisions of the bronchia. If the inflammation has been more intense, the redness extends to a greater number of tubes, and more so in the smaller ramifications. It is often, says M. Andral, that the redness is exactly limited to the bronchia of one tube, and commonly it is the upper one which is more peculiarly disposed to inflammation. The fine injection on which the red colour depends, seems to exist simultaneously both in the mucous membrane and in the sub-mucous cellular tissue. Sometimes the redness diminishes progressively from the large bronchia towards the small ones; at other times the reverse is met with. Often the redness presents itself in patches, constituting, as it were, so many circumscribed inflammations, between which the mucous membrane is white and healthy — a state of parts similar to that which is so frequently found in the intestines. On opening the thorax the lungs do not in general collapse, the escape of air being prevented by the obstructions of the bronchia. These in most instances contain a quantity of frothy liquid, of the quality of the matter expectorated before death. Not unfrequently it is mixed with bloody serum; but as this is not perceived in the matter expectorated, it is probably an exudation from the distended blood-vessels at the moment after death. Purulent matter is, also, sometimes observed, and mostly in very acute cases, which have proved fatal within four or five days.

When the inflammation has been chronic, the bronchial mucous membrane generally loses its bright redness, and presents a livid, purple, or brownish tint. For this change of colour from a deep red or rosy hue we are prepared. But we should hardly, *à priori*, have said that there would be cases in which the mucous membrane of the air-passages was white through its whole extent. Both Bayle and Andral, however, cite such cases; and I have witnessed such myself in persons dead of small-pox, in whom, too, the ulcerated spots were distinctly seen extending from the larynx into the bronchia, and the intermediate spaces of a natural colour. These appearances were seen in the bodies of persons who had died in an advanced stage of the disease, after the third week. It should not, as M. Andral justly remarks, be inferred that inflammation did not exist, because the membrane is thus found white. Analogous appearances are presented in other inflamed tissues. Thus, serous cavities filled with pus and lined with false membranes, frequently present no change of colour, no appreciable alteration in their texture. The intestinal mucous membrane, though traversed with numerous ulcerations, often presents a remarkable paleness, either in the very place where these ulcerations exist, or in their intervals. More than once, in individuals whose urine was for a

long time purulent, the mucous membrane of the calyces and pelvis of the kidney has been found very white; in these different affections of mucous tissues an inflammatory process could not be called in question; but whether, by reason of its long standing, or in consequence of general debility, the inflammation appears to have left no other traces in the organ which was the seat of it than a change in its secretion: thence very often result new therapeutic indications. (Andral's *Clinique Medicale.*)

Treatment. — The advantage of the physical signs of bronchitis, is to inform us with certainty of the first coming on of an inflammatory affection of this character. When, with the febrile state before described, whether the functional disorder be permanent or not, we find extensive rhonchi in every part of the chest, especially if they extend to the inferior parts, and there be little respiratory murmur audible, we should not hesitate to resort at once to depletory measures admissible in the individual case. These will consist of bloodletting, by venesection, or by cupping or leeching, and the exhibition of antimonials and mercurials.

In acute bronchitis, both in children over a year old, and in adults, if the pulse be hard and frequent, and the respiration deranged in the manner already described, the lancet should be had recourse to at once. The physician will remember, however, that, in inflammations of the mucous tissue generally, and the disease under consideration forms no exception to the remark, he must not expect by bloodletting to make that decided and permanent impression which he does in phlogosis of the parenchyma of an organ, or of its serous membrane. Hence, whilst he bleeds so far as to relieve decidedly the existing oppression, he will not urge it to the producing of syncope. His aim must be to bring down the inflammation to the secreting point, for expectoration, but not to sink the excitement and depress the strength of the body below this point. The inflammation still persisting, or originally occurring in persons in advanced life, or of a weakened and cachectic habit, and the pulse exhibiting little hardness, local depletion is entitled to a preference over venesection; and that procured by cups is preferable to leeching. In severe cases, the patient should be cupped over the part which auscultation had proved to be most affected. If no selection be made on this score, the cups should be placed under the clavicles, or between the scapulæ. The opinion first clearly pointed out by Broussais, of the greater advantage from local depletion exercised over the upper than over the lower parts of the chest, must find confirmation from every observing practitioner. Even at an advanced stage of the disease, local bloodletting may be resorted to, if the expectoration have become suppressed, and there is coincident fever and irritation, and increase of dyspnœa not caused by over secretion — a point this ascertained by auscultation.

Next to the remedy just mentioned, a free evacuation of the bowels

will often give the greatest relief. There is no disease of the thoracic contents in which free and early purging is so beneficial as in bronchitis; I have been most sensible of this fact in the epidemic form of the disease, or in influenza, in which, be it said, also, there is frequently a complication of gastric and intestinal disorder.

Emetics have been strongly recommended in bronchitis; and in the stage in which there is excess of secretion, and filling up of the tubes from this cause, and consequent oppression of breathing, particularly in children, they are decidedly efficacious. But in the first and more violently acute stage, in which there is no secretion, or it is sero-mucous and thin, tartar emetic in contrastimulant or sedative doses is entitled to a preference. This remedy will either follow bloodletting as an adjuvant, or take its place in cases in which, although the dyspnœa and fever be considerable, we are afraid for other considerations to abstract blood. The vomiting which follows repeated doses of the tartar emetic is more serviceable, because implying a solution, however temporary, of the disease, than that which is brought on at once by a large dose. From an eighth to a fourth of a grain, according to the age of the subject, may be administered every hour until a decided abatement of the symptoms follows. This simple prescription is preferable greatly to common expectorant mixtures, which often only irritate and tease the stomach, and just serve to increase the secretion without either adequately abating or modifying the inflamed condition of the bronchial mucous surface. We have in the former case, that in which tartar emetic is used, a definite object to be accomplished by a *modus operandi* which we can measure and appreciate; in the latter we wait for, we know not what, results, and with an expenditure of time, which, in acute disease, can never be afforded to doubtful measures or timid expectancy.

The considerations which should guide us in the exhibition of tartar emetic in bronchitis are well defined by Dr. Stokes, seemingly the more so to me because they correspond with my own experience, which has been considerable with this remedy in thoracic affections, ever since my visit to Italy and acquaintance with the new Italian medical doctrine of counterstimulus. Even now, after so much has been written on the subject, I may refer you to my paper, one of the first in order of time, on *Counterstimulus*, in Dr. Chapman's *Medical and Physical Journal*, vol. iii. Thus, the more robust the patient, the more acute the disease, the more bloodletting has been indicated, the better it has been borne, the more inflammatory the blood, the earlier the period at which the disease has been met by treatment, and last, though not least, the more simple and uncomplicated the affection, particularly with abdominal diseases, the greater will be the certainty of tartar emetic exerting that singularly sanative action which has justly obtained for it the name of heroic. On the other hand, where the disease has occurred in a debilitated constitution, where the pulse

has not been strong, nor the skin very hot, where the teeth are coated with sordes, and the tongue red or dry and chapped, where the abdomen is swelled, and tender in the epigastric and ileo-cœcal region, where there have been diarrhœa or vomiting, and pain in the abdomen; in such a case or cases, the tartar emetic will either not be borne at all, or, if retained on the stomach, will exert comparatively little influence on the pulmonary disease, and too often increase the gastric symptoms.

Laennec recommends an aromatic and opiate to be combined with the antimony, as in the following solution:—

℞. Tart. antim., gr. vi.
Aq. cinnam., ℥vi.
Tinct. opii acet., gtt. xii. M.

Of this solution half an ounce, a table-spoonful is to be given every hour or second hour, so that, if possible, the whole of the six grains may be consumed in the course of twenty-four hours. For many years I was in the habit of giving the tartar emetic simply in combination with cream of tartar, either in the form of powder or solution as recommended by Rasori,—with the occasional addition, as circumstances seemed to warrant, of opium or laudanum. Of late years, however, I have prescribed the medicines in question with camphor water, and a little laudanum.

The immediate effects of the antimonial practice are various. In a few cases, particularly where the stomach had been foul, free vomiting is produced, and, less seldom, purging: but after repeating the remedy two or three times, it fails either to vomit or purge until the morbid excitement is reduced, and then the *toleration* of the system to the medicine having ceased, nausea, vomiting, and prostration are produced, and would be perilously increased by its continuance. In a majority of cases, however, in which there is decided phlogosis of any of the thoracic viscera, tartar emetic barely causes nausea, and this chiefly when the patients moves.

In evidence of the tolerance by the system to full and repeated doses of tartar emetic, I would refer to the case of a person labouring under bronchitis complicated with pneumonia, which was attended by Dr. Otto of this city and myself about five years ago. The patient became delirious, and would not take any medicine which was prescribed for him. Both on account, therefore, of its relative want of taste, and of its being adapted to the stage, which was the second one of the disease, we prescribed tartar emetic dissolved in some simple drink slightly sweetened. The dose of the medicine was increased from half a grain to two grains every two hours, so that in one twenty-four hours more than twenty grains were taken. This practice was continued for four or five days, gradually reducing the dose of tartar emetic, and with the best effects: the delirium was removed; the expectoration became loose and free,

the matter being thick and opaque; and the pulse was abated of its great frequency. In some instances so little apparent effect is produced, so far as regards its action on the stomach, bowels, skin, and kidneys, that the remedy might be considered as inert, were it not for the disappearance of the symptoms and signs of pulmonary disease. Dr. Stokes relates his having frequently seen patients who were using from six to ten grains of tartar emetic daily, yet who had a good appetite for their food. An advantage is attributed by this gentleman to the use of tartar emetic, even when it fails to bring about the restoration of the disease. It is this; stimulants and tonics will have now a better effect after we desist from the use of the medicine in question. This advantage occurs in all cases in which depletion has been freely and timely practised. Stimulating remedies, which, even in the second stage of this disease, have only increased the indirect debility caused by continued and unchecked excitement, will now kindly restore the feeble powers of life, and reanimate the exhausted functions.

After the employment of the tartar emetic, or in conjunction with it, the hot bath will frequently be of decided benefit, but it should be confined to the lower limbs, or the lower portion of the body at most, by immersion of the pelvis and legs. In this way a salutary derivative effect may be obtained. The heat of the water when this half bath is used should be from 98° to 102°; and the time of immersion about ten minutes.

The period of inflammatory excitement having passed, and the respiratory distress, with the diffused rhonchus still continuing, counter-irritants should be had recourse to. A blister is to be applied so as to cover the anterior part of the chest; or, that which is preferred by some practitioners, tartar emetic is to be rubbed on until a free eruption is induced. To insure its prompt action, the chest should be first well rubbed with a brush or a piece of course flannel; or the skin may be still farther excited by applying a warm hand wetted with camphorated spirits, or by a short application of a mustard poultice. The tartar emetic should then be immediately rubbed in, either in the form of a warm saturated solution, or an ointment composed of one part of tartar emetic to two of spermaceti ointment. With these precautions, adds Dr. Williams, who gives this formula, we shall rarely fail to excite a full pustular inflammation in as short a time as that required for the rising of a blister, with far less irritation to the system, and with decided relief to the pectoral symptoms. Partial as I am to the use of tartar emetic in this way in many diseases, I still prefer a blister in the one now under consideration: the counter-irritation produced by it, in the capillary injection and inflammation, and in the effusion of serum on the cutis, is more complete than that caused by tartar emetic; and the subsequent pain is, judging from my own feelings, certainly less than that from the latter. A blister should not be allowed to remain on a child for more than three or four hours, or until its action

has been distinctly felt by the patient. It is to be then taken off, and the part dressed; after which vesication takes place. It is advisable, also, as recommended by Bretonneau, to cover the blister with a leaf of fine paper. An emollient poultice, applied after the venesection is induced, I have often found to be of great service.

In the cases in which disease of the abdominal viscera is complicated with bronchitis, and in subjects not robust and easily depressed by remedies, and in whom there is more evidence of congestion than of excitement of the circulation, calomel combined with ipecacuanha will be preferred to the tartar emetic. I have, every now and then, seen ipecacuanha, in small doses particularly, to have rather an irritating effect than otherwise in inflammatory affections, and certainly, except in coughs of gastric origin, it has no beneficial one that I have witnessed. Hence, if the combination just mentioned does not soon relieve the bronchial distress, or apparently increases it, we must not give up the calomel, but administer it alone, or with very minute doses of Dover's powder, in which the opium is the active ingredient. In more than one epidemic bronchitis among children, I have found, in common with others of my professional brethren, calomel to be the remedy of the greatest efficacy, given with a freedom, too, which at other times would be hazardous. Should the bowels be irritable, a few grains of prepared chalk may be usefully added to the calomel.

The plan of treatment now laid down will often suffice to arrest bronchitis, and bring it to a satisfactory termination. But if they fail to do so, the disease passes into a second stage, which I will not qualify with the epithet of collapse, as some writers have done. It is one in which general debility predominates, whilst the morbid local action is still going on. The skin is cold, it may be clammy; the pulse small and frequent, or soft and compressible; tongue foul and moist; renal secretion small; whilst the accumulation of mucus in the bronchia is increasing, with evidently less power of throwing it off by expectoration. An emetic will often give relief at this time: it should be of ipecacuanha, since our object is merely to evacuate, by a moderate effort, the bronchia, without depressing the general system. For this reason, in asthenic bronchitis, as a general rule, ipecacuanha is preferable to tartar emetic as a vomit. It is now that the class of expectorants, which in the first stage would have been for the most part mischievous, may be advantageously enlisted in the treatment: those of the stimulating class being preferred. At this time, also, the alkalies may be had recourse to, united with some stimulant. Carbonate of ammonia, mixed with lac assafœtida, answers admirably, and enables the child, or the old person, to throw off the mucus with comparative ease. Aiding to the same end, a tea-spoonful of wine-whey now and then for a child; and in proportionately large doses for an adult should be tried; its continuance to be regulated, of course, by the pulse and the state of

the skin. So long as the first is weak and the latter cold, we may persevere with good effect. Preferable still to the remedies just mentioned in the minds of many practitioners, is a decoction of the polygala senega, with the addition of the liquor ammoniæ acetatis, or the carbonate of ammonia. If, apart from the symptoms of general debility and difficult expectoration, we find evidence of congestion or inflammatory engorgement of portion of a lung, the use of calomel in minute doses may still be continued, during the period in which stimulants are administered. Even a scarifying cup or two over the diseased portion is sometimes admissible.

Of diaphoresis I have said nothing, believing that remedies specially given with a view to produce it will either be misplaced by their character or by their interference with others already mentioned. Tepid drinks, moderately warm bed-clothes, an equable air of the chamber, and the occasional use of the warm semicupium or half-bath, will generally keep up a moist state of the skin, whilst they contribute to give effect to the more active plan of treatment already indicated.

I would dismiss diuretics in as summary a manner as diaphoretics, if the former could only be administered with sole reference to their action on the kidneys, and not in harmony with the state of the circulation, in bronchitis. But there are certain remedies, such as nitre, digitalis, and colchicum, which are both sedatives and diuretics, and all of which have been recommended in the disease under notice, especially with a view to prevent effusion. Without pretending to specify the precise time when they are had recourse to, we can very well infer, from a knowledge of their general effects on the animal economy, that they will prove most useful in the early stage of the disease: they assist to keep down febrile excitement, and relieve the inflammation of the bronchia, by means of derivation by the kidneys. When given with a view to their antiphlogistic operation, tartar emetic is combined with one or other. If you prescribe such a combination, you should be aware that it is one of the most active in the materia medica, and you will be required in consequence to watch vigilantly the first evidences of sedative operation, and either to desist from the medicine, or to diminish the dose, or prolong its administration, before prostration is induced, which, as in certain cases in children and in old persons, cannot be supported nor always readily recovered from.

Secondary or Symptomatic Acute Bronchitis. — Our treatment of various diseases will be readily modified by the extent to which bronchitis is associated with them, either as a primary symptom or one of secondary occurrence. In measles, the chief danger, both in the first or acute stage, as well as after the disappearance of the eruption, is from bronchitis, the degree of intensity of which will guide us very much in the use of the lancet or analogous depletory agents. We must be prepared, however, at the same time, to see a complication, in the case of eruptive fevers generally, of asthenia with inflammation, which will prevent our carrying out in all its

simplicity the antiphlogistic treatment. More especially is this caution requisite in bronchitis with scarlatina. Now and then the complication is increased by the addition of cerebral disease. In such cases our reliance will be on local depletion, at the same time that we husband the strength of the general system, and even administer camphor and ammonia in alternation with calomel and ipecacuanha, and apply revulsives to the skin. Bronchitis is a frequent secondary occurrence in small-pox. During the epidemic visitation of this disease in 1823 and 1824, I frequently found my patients, more especially those in the hospital, sink under bronchitis and pleuropneumony after the eruptive febrile stage had been gone through, and the desquamation of the skin nearly completed. In some instances the bronchial disease was coeval with the pustular eruption, which appeared on the trachea and its ramifications at the same time with that on the skin; in others we had reason to believe that the inflammation of the bronchia was secondary, and consequent on the morbid impression of cold on an exquisitely sensitive skin not yet furnished with a new epidermis.

In the regular secondary bronchitis of small-pox and scarlet fever, accompanied with accumulated mucus in the bronchia, which oppresses respiration and interferes with the decarbonization of the blood, emetics should be had recourse to. In some extreme cases of depression and stuffing up of the bronchia, Dr. Copland recommends the following process, which, he says, he has employed with marked benefit. It consists in applying, over the epigastrium and lower part of the chest, a flannel wrung out of hot water and immediately afterwards soaked in spirits of turpentine, and allowing it to remain on until severe burning heat of the skin is produced by it. Internally camphor and ammonia, together with a hot decoction of the polygala senega should be used at the same time. Small doses of ol. terebinth. also might be given by the mouth, or in alternation with the remedies last mentioned.

As a general rule, emetics are useful in those cases of bronchitis complicated with scarlet fever, measles, and small-pox, in which a state analogous to diphtheritis is apt to occur. If sore throat and dysphagia be complained of, purgatives in full doses ought to be administered.

Bronchitis succeeding to acute laryngitis or tracheitis requires full and active depletion, in the manner already pointed out when speaking of laryngitis.

Hooping-cough.—One of the most common complications is of bronchitis with hooping-cough. I believe that, for useful practical purposes, we shall err least by regarding hooping-cough as chiefly a bronchitis, with some nervous and gastric disorder conjoined; and in treating it accordingly: and hence, in the incipient stage of the cough, I usually draw blood from the arm, and afterwards, if the violence and quick succession of the paroxysms indicate it, use cups or leeches to the chest; purge freely, and then have recourse to antimonials, the alkalies, and camphor and assafœtida. Revulsives

to the skin in the form of blisters, or of tartar emetic ointment, will come in as part of the treatment. An early recourse to expectorant or cough mixtures, is to the full as reprehensible in hooping-cough as in distinctly recognised bronchitis. In reverting to local depletion I may add, that I have never seen speedier and more complete relief afforded in violent disease than from the application of cups, and detraction of blood by their means, to the chest of a little child which was tormented, with scarcely any remission, by a succession of paroxysms of hooping-cough. If we begin by appropriate remedies in the first stage, we shall have little occasion for trials of the various antispasmodics, narcotics, and tonics, which, in combination or succession, are recorded and recommended in the second and advanced stages of the disease. Of the narcotic tribe, tincture of belladonna is the best; of the tonic, the sub-carbonate of iron; and, in obstinate cases, the arsenite of potassa — Fowler's solution. Whether we admit the cerebral origin of or complication with hooping-cough or not, I can speak confidently of the effects of leeches behind the ears, or cups to the nucha.

It is quite common for remittent fever, especially the autumnal, to be ushered in with, among other symptoms, a slight bronchitis, which, as the fever advances, may either disappear, or, a no unusual thing, be augmented, and thus complicate not a little the disease. In addition to the other phenomena of fever, we find the patient exhibits lividity of countenance, cough, hurried breathing, and expectoration. If, at the beginning, under the impression that, as we have to deal with both inflammatory irritation, perhaps positive inflammation in the chest, and a similar state in the abdomen, as in gastro-enteritis or gastro-hepatitis, we bleed freely, we shall give the patient the best chance in our power, both by abating the febrile disturbances and concomitant phlegmasiæ, and by keeping up the susceptibility of the system to other remedies, of whatever class they may be. But if, dissatisfied at the bronchial irritation still remaining, and the abdomen still continuing tender, with a show of gastro-enteritis, we bleed again, we do wrong; the more so, too, if we bleed largely, and with the expectation that we can strangle, as it were, the disease. We can do no such thing, but we may greatly and dangerously weaken the patient. It must be our aim now to ascertain the hold which the associated bronchitis still has on the system, and having done this, to try and remove it by local depletion and purgatives, provided these latter be not contra-indicated by the state of the stomach at the time. The disease in some instances predominates in the respiratory, in others in the digestive system; and we can, not unfrequently, observe a remarkable alternation of the predominance of disease, now in the thoracic and then in the abdominal viscera. More commonly, if there be disease of the respiratory mucous surface, there is an associated disease of that of the gastro-intestinal: the reverse does not prevail with the same frequency. But as it is not my intention here to discuss the pathology and

treatment of remittent fever, except in connection with bronchitis, I shall pass on to another and more advanced stage of the fever, in which it has assumed a typhoid form. We are now pretty well assured that the morbid condition of the mucous surface of the gums and tongue, by which they become incrusted with sordes and dark matter, prevails lower down, and has even extended to the bronchia, so as obviously to interfere with the regularity and completeness of respiration. The blood is not changed as completely as it ought to be in its passage from the pulmonary artery to the pulmonary vein, owing to the inspired air not being able to reach it through the secreted coat of mucus which covers the bronchial mucous membrane. What shall we do at this juncture, when probably the brain is disordered at the same time, either in consequence of inflammation of its arachnoid membrane, or of the flow into it of the carbonated blood, which has not been purified in the lungs before it reached the left side of the heart. If this collection of symptoms, of which the stomach and intestines furnish a full share which I do not now enumerate, have followed originally associated bronchitis, we can have the less difficulty in framing our treatment, with a view to its probable persistence at this time, even though we should not make our diagnosis clearer by percussion and auscultation. The brain, the pulmonary apparatus, and the abdominal viscera, are now all suffering, perhaps all more or less phlogosed; but the organ, the partially suspended function of which is most prejudicial, is the lungs. It is now no longer a question, however, whether venesection is to be practised or not. This might have been debated during the first stage. All that is left for us is, to discuss the propriety of local depletion. Were we to be influenced by the general symptoms, even this would seem to be inadmissible; but morbid anatomy has revealed to us the condition of the bronchial mucous membrane at this period, It is red almost universally, and the bronchia are filled with mucus. We attempt, therefore, the relief of this morbid state of the bronchia by cupping between the shoulders, or on both sides of the chest; and the depletions, says Dr. Stokes, are afterwards repeated in different situations, according to the stethoscopic signs of predominance of disease. The respiration will also be greatly relieved by the use of terebinthinate and assafœtida enemata. Following the cups come blisters, which long experience declares should be between the shoulders rather than in front of the chest; and if this be difficult, on account of the posture, on the back, and extreme prostration, they should be applied to the sides of the thorax. Contradictory as it may seem, there are cases in which, whilst we deplete, to relieve the congested lung, nutritive and diffusible stimulants are called for to keep up the general strength, unless we are prohibited from using them by the excessive tenderness of the stomach, the morbid heat of the epigastrium, and a dry, red, and shining tongue, and compelled to be spectators, waiting and watching anxiously for every fair indication to act. One of these is to apply a few leeches over the epigastrium.

Whilst we attend to the state of the skin and endeavour to preserve it of an equable warmth, by directing flannel to be worn, and thus to promote insensible perspiration, we are not, I think, precluded from the admission of cool as well as fresh air into the apartment of the patient. I have known patients to be tossing about from side to side, complaining of a sense of heat and oppression at the chest, and unable to sleep, who, on the introduction of fresh and cool air into the room by the opening of a window, became composed, and soon fell into a tranquil and refreshing slumber. The inflamed state of the bronchia, the impediment to the access of air to the lungs, and the consequent imperfect hematosis, would all seem to indicate the advantage of the freest supply of air to the lungs, at the very time that we envelop the skin in warm clothing.

Dr. Armstrong was fully impressed with, perhaps even somewhat exaggerated, the dangers from the bronchitis secondary to typhous fever, or, as he called it, special bronchitis. While in the primary and common form of the disease, the danger is chiefly from the quantity of mucus secreted exceeding that which is expectorated, our apprehensions are excited in the secondary form by the quality of the secretion. It is, in this latter, more sticky, like varnish smeared over the bronchial lining, so as far more effectually to exclude the air from contact with the blood, than is the case with the less sticky but more copious secretion in common bronchitis. And all those fevers, continues Dr. A. (*Lectures on the Morbid Anatomy and Treatment of Diseases*), which are called typhous, typhoid, putrid, low, or malignant fevers, owe their characters to this special bronchitis.

If, without too much fatiguing the patient, he could be made to inhale the simple vapour of water, alternately with one of the more stimulating gases, as chlorine, the effect would probably be useful towards a solution of this varnish and adherent mucus; and a not ill-timed excitement of the bronchial vessels, to enable them to throw out a modified and more fluid secretion.

Change of posture is desirable in this variety of secondary bronchitis, as it is in every form of congestion of the lungs. The patient should be turned on one or other side, or at least made to incline in that direction, by being propped with soft pads or air-cushions to his back. A decided predominance of disease in either lung will be an indication of the necessity of his lying or being turned on the one opposite to that affected.

In the very last stage of this secondary bronchitis, or that with typhoid fever, when hope is on the point of forsaking us, the patient lying on his back nearly insensible, the mucus having choked up the bronchia, with its rattle in his throat, temporary, but immediate, and even sometimes, though more rarely, permanent relief, has been procured by an emetic, to be repeated at intervals, if a renewal of the symptoms calls for it.

Dr. Graves has recommended a new, and, in his hands, successful means of arresting the excessive bronchial secretion, the con-

tinuance of which to this extent is always harassing to the patient, and often hazards his life. This gentleman proposed the employment of a combination of quinine ten grains, and of laudanum twenty drops, in the form of enema. He gives the details of three cases in which the patients were moribund, but in whom life was clearly saved by this treatment. Justice to the author requires that we should give his own ideas as to the discernment to be exercised by the practitioner in the selection of cases for the administration of the above remedies. "An accumulation of mucous secretions in the air-passages," remarks Dr. Graves, "producing the rattles, forms the closing scene of almost all diseases however different in their nature. To exhibit remedies for this would be ridiculous: it is only when this accumulation is the direct consequence of actual disease attacking the air-passages themselves, that we can hope for its removal. In such cases, we must try everything that experience has proved to be even occasionally useful, and must carefully watch the effect of each new medicine; for it must not be concealed, that very different results are obtained from the same remedies under circumstances apparently similar. The injection of sulphate of quinine and laudanum possesses, as appears from the cases I have detailed, very great powers, and for that very reason must be used with circumspection; for if exhibited at an improper period of the disease, or in cases where expectoration is at all scanty and difficult, it may produce dangerous consequences."

Sugar of lead has been given under these circumstances of disease with a very happy effect.

LECTURE LXIV.

DR. BELL.

CHRONIC BRONCHITIS. — Description of—Expectorated matter—pus with hectic fever—Difficulty of diagnosis of chronic bronchitis with purulent expectoration —Ulcerations of bronchia are rare—*Causes*,—primary irritation of the lungs,—and secondary in other diseases—Bronchitis after gastric irritation—Stomachic cough—Its diagnosis—Bronchitis with intestinal irritation,—with other morbid states,—gout, syphilis, &c.—*Treatment*, modified by cause—Venesection not often required—Local bloodletting preferable—Purgatives,—Antimonials—Calomel or blue mass, with ipecacuanha and hyosciamus—Colchicum and digitalis—Hydriodate of potassa—Tonics with the balsams—Compound syrup of sarsaparilla with iodine or iodide of iron—Counter-irritants to the chest—Inhalation of various vapours—Modification of treatment in complicated chronic bronchitis—Visits to mineral springs—Change of air and climate—*Prevention* of chronic bronchitis.

CHRONIC BRONCHITIS. — It has been well said, and the remark is one of great practical value, that chronic bronchitis is not separated by any distinct line from the acute form of the disease. The two pass by insensible gradations into each other, and are often conjoined, for, although acute bronchitis frequently exists alone, chronic

bronchitis is rarely free from occasional admixture of acute inflammation supervening on it, in consequence of the exposure of the invalid who is labouring under the former to the causes which brought on the disease primarily, such as sudden mutations of temperature, or errors in clothing, &c. If we would be sure that we have to do with a chronic inflammation, the knowledge must be acquired by an observation of the symptoms derived from the pathology of the mucous membrane itself, and not simply from the duration of the disease. We every now and then see acute bronchitis in which attack succeeds to attack during many weeks, with a retention, all the time, of its original character. So long as the expectorated matter remains glairy and viscid, uniting in mass and without opacity, the inflammation is acute. Towards the termination of an attack of this kind the sputa become opaque and are expectorated in distinct masses, which, although consistent, are not very adhesive or glutinous. Sometimes, instead of being diminished and more consistent, as when the disease is about to terminate, they remain in this state, or increase and become diffluent and heterogeneous in quality without sensible increase of fever, and they then indicate inflammation of the chronic kind.

Doctor Williams describes the disease with such clearness, that I shall adopt his language. Chronic bronchitis in its slightest form manifests itself only by habitual cough and expectoration, which are increased by certain changes of weather, and generally prevail most in winter and spring. It is more common in advanced life, and, in fact, very few old persons are perfectly free from it. In its severe forms it is accompanied with dyspnœa, occasional pain in the chest and about the præcordia, and some febrile symptoms, especially towards evening, palpitation, and disorder of the digestive functions. The cough is sometimes very severe, especially at night, and the expectoration copious; and if these persist long, they seldom fail to waste the body and reduce the strength.

To this description it may be added, that even with considerable emaciation the appetite is often good, and the digestion regular. Chronic bronchitis will, if not restrained, end fatally; but more generally when this result takes place the disease is complicated with tubercular phthisis, which on these occasions it would seem to have developed.

The appearance of the expectorated matter in chronic bronchitis is various. Sometimes it is precisely similar to that in the latter stage of the acute form; but most commonly it is less glutinous, more opaque, and nearly puriform. Occasionally, it is of a dirty-grayish or greenish hue, from, as Laennec thinks, an admixture of the pulmonary matter; and in this state it cannot be distinguished from the expectoration of phthisis. In some cases it is real pus, and presents all the varieties that are seen in pus from other sources; in its being inodorous, as from a recent wound, or, again, having the strong odour of the contents of a large abscess, and occasionally

approaching the gangrenous fetor. After a period, this bad smell disappears, but it may return perhaps several times in the course of the year. When the secretion is obviously of pus, there are not unfrequently a quick pulse and signs of hectic, and a tendency of the disease to a fatal termination, with night sweats, emaciation, diarrhœa, and all the common symptoms of pulmonary consumption. The following case, related by M. Andral (*Clinique Medicale*), is an example of this variety of chronic bronchitis, in which also the tracheo-bronchial mucous membrane was white.

A locksmith, twenty-seven years of age, entered La Charité Hospital during the month of December, 1821. For the two years preceding, this man has been tormented with a constant cough: he had never spit blood. When we saw him, he was in a state of marasmus: he expectorated sputa, formed of greenish, round patches, separated from each other, and floating in an abundant serum: these sputa were inodorous, and appeared to the patient to have a saccharine taste. The respiration was a little short; he could lie down in all postures; the chest when percussed resounded equally well in all parts; some mucous *râle* was heard in different points; there was no appearance of pectoriloquy; the pulse was not frequent in the morning, but became so towards evening; every night the patient perspired a little. The digestive functions presented nothing remarkable.

What diagnosis, continues M. Andral, could be given here? Auscultation informed us, to be sure, that there was no tubercular cavity; but the aggregate of the other symptoms seemed to announce, that numerous tubercles, beginning to soften, existed in the lungs.

The marasmus and debility increasing, and diarrhœa also supervening, together with disturbance of the intellect, the patient died in a half comatose state.

Post mortem examination revealed the following particulars: — A sero-purulent infiltration of the sub-arachnoid cellular tissue of the convexity of the hemispheres; lateral ventricles distended with turbid serum. Pulmonary parenchyma sound, but slightly engorged. The internal surface of the larynx, trachea, and bronchia, traced as far as their smaller divisions, presented everywhere great paleness; the mucous membrane (of the air-passages) exhibited no other appreciable alteration; white fibrinous concretions distended the right cavities of the heart. The digestive canal, opened to its entire extent, presented no other lesion but a bright redness, scattered in patches over the great intestines.

Here we have a case which presented all the rational symptoms of phthisis, although the lungs were sound, and evidences of decided lesion of the bronchial mucous membrane, which, notwithstanding, was in a state that would have been declared sound, had we been ignorant of the patient's condition before death. This case serves also to apprise us of the difficulty of distinguishing a simple chronic bronchitis from a tubercular degenerescence of the lungs. What,

as M. Andral asks, can auscultation tell us in this case, except that there are no cavities? Let us, he continues, draw from it this conclusion; that so long as the existence of tubercles shall not be ascertained by the stethoscope, the return to health should not be deemed impossible, by the cessation of the bronchitis, which occasioned all the symptoms. It is against such an inflammation of the mucous membrane of the air-passages, that a great number of hygienic and therapeutic means have often succeeded, which, if directed against real phthisis, would certainly have failed, or at most would merely have retarded for a little the progress of the evil.

Much stress is sometimes laid, but without reason, on the large quantity of expectorated matter in a doubtful disease of the pulmonary organs. The quantity in chronic bronchitis varies from day to day, but it is almost always greater in the acute disease; not unfrequently amounting to one or two pints in the twenty-four hours. It is increased by every attack of cold; or rather the mucous secretion is at first less, with more watery discharge; and then, after a few days, becomes more copious. In some rare cases it becomes all at once, and usually without obvious cause, so very abundant and puriform, as to lead to the suspicion of a vomica being opened into the bronchia; a mistake which is more likely to happen on account of the oppression which usually precedes and accompanies this state. The oppression, however, is owing merely to a great increase of the morbid secretion,—which may itself accumulate to such a degree in a weakened subject as to cause suffocation and death. A remarkable case (No. 17) of this nature is given by M. Andral in his work frequently quoted by me in this lecture. It is headed—*Acute bronchial flux producing death by asphyxia in an individual affected with pneumonia and chronic bronchitis.*

Ulcerations of the bronchia are rare, as are softening of their mucous membranes. The frequency of ulcerations decreases from above downwards in the different portions of the mucous membrane of the air-passages. Thus, in chronic laryngitis they are common enough. It is not rare to find a part of the chordæ vocales stripped of mucous membrane, the thyro-arytenoid muscles and the cartilages exposed to a greater or less extent, in persons who, affected with simple chronic bronchitis or pulmonary tubercles, had their voice for a long time hoarse or entirely destroyed. The remarkable feature in such cases is, that in a great majority of them, these ulcerations exist only when there is at the same time inflammation of the lower parts of the mucous membrane of the air-passages.

In the trachea, ulcerations become less frequent than in the larynx: they are generally small, and are not at all numerous—seldom extending beyond the mucous tissue proper.

Auscultation, although it cannot apprise us positively of the exact condition of the bronchia in all their morbid changes, is still a valuable adjunct towards our obtaining a correct diagnosis in

chronic as it was shown to be in acute bronchitis. The respiration and cough are heard with various rhonchi — mucous, sonorous, sibilant, and clicking, which are continually shifting and changing. There is no bronchial or cavernous respiration, and, it is added by writers commonly, there is no permanent absence of respiration in a part, no unusual resonance of the voice: and in spite of the continuance of the copious and puriform respiration, on listening, day after day, we still find no signs of a cavity, no cavernous rhonchus, or pectoriloquy. But the assertion, that there is no permanent absence of respiration in a part, must be received with some qualification, as we every now and then find a case like that (No. 2) recorded by M. Andral, headed—*Chronic bronchitis—narrowing of the principal branches of the upper lobe of the right lung; and almost entire absence of the respiratory murmur in this lobe.*

Chronic bronchitis is often a very obstinate, as it is a harassing and fatal disease, especially to those of weakly frames. Death results either from the disease itself, or the complications to which it gives rise in the altered structure of the bronchial tubes and of the lungs.

The *causes* of chronic bronchitis are the same with those of the acute form, except that the secondary chronic, or that supervening on other diseases, more commonly follows these than appears, like the acute, either simultaneously with them or soon after their inception. The habitual inhalation of dust or fine metallic particles, detached in various processes on the arts, is a cause of a distinct variety of chronic bronchitis.

Stone-cutters, needle-pointers, they who powder and sift the materials for making china, and leather-dressers, are particularly liable to the disease. The first and most marked symptom in these cases is dyspnœa, which may continue, however, for a considerable time without the disease declaring itself. But in the course of a few months the dyspnœa is increased, and is accompanied by severe cough and a copious expectoration, sometimes mixed with pus and blood. Not unfrequently the cough brings on a profuse hæmoptysis. At this time the constitution generally suffers much,—the pulse becomes quick; thirst and fever attend; the tongue is loaded; and the aggravation of dyspnœa occasions lividity of the countenance. Unless, continues Dr. Williams, whose description I am now repeating, these symptoms are relieved by remedies, and a total abandonment of the unhealthy occupation, they become worse; the expectoration increases to a great extent, and becomes more purulent; hectic with night sweats succeeds; and the patient dies with most of the symptoms of tubercular phthisis.

In early life, chronic, which in such cases might be called also *secondary bronchitis*, occurs after hooping-cough, measles, small-pox, or some cutaneous eruption.

Farther examples of the occurrence of secondary bronchitis are furnished in the irritation of the lung supervening on abdominal disease, and particularly of irritation of the stomach, constituting what

is often called sympathetic or gastric cough. The following are the symptoms, as given by Broussais in his *Phlegmasies Chroniques* (translated by Drs. Griffith and Hays). It comes on with violent shocks, which occur at each inspiration, but without swelling and lividity of the countenance, as in hooping-cough. The expectoration will be proportionate to the degree of bronchial-irritation; sometimes it is wanting, at other times present; but the excretion may be suspended by means calculated to relieve gastritis, and this suspension is favourable to the patient. This secondary or stomachic cough is no new discovery; it is associated with either acute or chronic disease of the gastro-intestinal mucous surface; being in the first case marked by more violence, and more likely from the existence of fever to become complicated with pulmonary inflammation. In reference to an accurate discrimination of these kind of cases from primary chronic bronchitis, we may say that when there is a want of proportion between the physical signs and functional derangement, we are led at once to the correct principle of diagnosis. This is laid down by Dr. Stokes to be — *That when distressing pectoral symptoms exist, the morbid physical signs being either absent, or, if present, yet revealing an amount of disease too slight to account for the symptoms, we may make the diagnosis of sympathetic irritation.* If a patient has had fever, cough, and hurried breathing, for three or four days, and no commensurate signs exist, we may be tolerably sure that there is no actual or progressive inflammation; for, if there were, it would have by that time fully manifested itself.

I the more willingly introduce here the valuable details on this head furnished by Dr. Stokes, because the diagnosis is of great practical moment in a complication of maladies, which is, I know, of frequent occurrence, and the treatment of which is subject to fluctuations injurious if not perilous to the patient. Thus, persons labouring under gastritis, or gastro-enteritis, have been largely bled, and thrown into a typhoid state; or the abdominal inflammation has been exasperated by the use of remedies intended to relieve the pulmonary irritation.

In making this diagnosis, the following are the principal points which must be attended to in order to avoid error: —

First. Whether the symptoms or signs of incipient tubercle are absent.

Second. Whether there is reason to suspect disease of the larynx or trachea.

Third. Whether the uvula be or be not relaxed.

Fourth. Whether the patient (if a female) be subject to hysteria.

If the result of an investigation is against the existence of any of these causes, we may safely infer the abdominal origin of the cough; and it will not be difficult to decide between gastritis and worms. Thus enlightened, we shall succeed in curing readily protracted gastric cough, which had proved intractable to general depletion on the one hand, and various stimulating expectorants on the other, simply by a removal of the gastritis. For this purpose,

leeches to the epigastrium, iced water, and a bland diet, will often suffice.

The association of bronchial with intestinal irritation, though of less frequent occurrence than bronchitis with gastritis, merits notice here. Without considerable attention to the diagnosis, a physician may be so far deceived as to take, for remittent pulmonary irritation of the lung, a case of intestinal worms with sympathetic cough and fever. I had, some years ago, a case of this kind occurring in a young girl about seven years of age, in which the pulmonary symptoms with remittent fever were well marked: but the state of the abdomen, the appearance of the tongue, and the commemorative history, persuaded me that the patient laboured under worms. By prescribing accordingly, she was entirely relieved after a week's suffering, during which the cough was frequent and harassing. I did not avail to the full extent of the signs furnished by auscultation, but I was not a little influenced in my opinion by the entire remission from day to day of the bronchial irritation.

There are other varieties of chronic bronchitis, also of a secondary nature, but depending on slower constitutional diseases than those mentioned. It would be more correct language were we to say, that in the progress of certain chronic diseases the bronchial mucous membrane is sometimes violently affected, and that this bronchitis is cured by the same class of remedies which are adapted to and successful in the original disease. I cannot concur in the ideas conveyed by the expression, "that the gouty, scrofulous, syphilitic, and scorbutic contaminations, may, and no doubt do, produce their specific forms of bronchial inflammation." The fact of bronchitis preceding, alternating with, or following an attack of the gout, is not to my mind evidence of the specific or arthritic character of the former. Having explained myself on this score, when discussing professedly the nature and mutations of gout, I shall not return to the subject here. A more enlarged view and experience of the operation on the different organic systems of different active medicines, will show that the cure of a particular affection by a remedy which has been successful in gout, for example, cannot be received as evidence that the former was also a modification of gout. This kind of argument was at one time common; as, for example, when a cough or a pain in the head was removed by colchicum, it was forthwith inferred that these disorders were of an arthritic character. Now, we know, from extended trials with this remedy, that it is adapted to a great variety of diseases which, in the nosological catalogue, have no affinity to each other. I have frequently prescribed it in bronchitis with manifestly good effect, in cases, including my own, in which no suspicion of gout could be entertained.

These remarks are not meant to apply to another variety of chronic bronchitis consequent upon syphilitic irritation. Syphilis, unlike gout, attacks, in its successive stages, a certain order of parts, viz., the sero-mucous membranes, skin, fibrinous membranes, and bones. That in its progress the respiratory mucous mem-

branes and the digestive ones should suffer, is not incompatible with our existing knowledge of its organic seats. The upper part of the digestive canal, or the palate, tonsils, and pharynx, are parts commonly enough assailed by secondary syphilis, as is the larynx or upper part of the air-passages. Participation of the bronchia in this modification of laryngeal disease, or independent syphilitic bronchitis, has not probably engaged attention so much as it deserves. In this country, happily, a satisfactory reason exists, in our so seldom seeing bad and protracted cases of syphilis out of the hospitals.

The bronchial disease of syphilitic origin is spoken of by Dr. Stokes, as either an acute or a chronic affection. In the first, he thinks it analogous to the bronchial irritations of the exanthemata, of which he has seen a few interesting examples; whilst in the second, there is a chronic irritation which, when combined with the syphilitic hectic and with periostosis of the chest, closely resembles true pulmonary phthisis. In the first of these cases he has observed that, after a period of time from the first contamination, the duration of which has not been determined, the patient falls into a feverish state, and presents the symptoms and signs of an irritation of the bronchial mucous membrane. These having continued for a few days, a copious eruption, of a brownish-red colour, makes its appearance on the skin, and the internal affection either altogether subsides, or becomes singularly lessened. Dr. Byrne, physician to the Lock Hospital in Dublin, is quoted by Dr. S. as corroborating by his experience these views. The former gentleman states that he has in many instances seen patients, who had been formerly diseased, and who had come into the hospital either on account of new sores or of gonorrhœa, attacked with intense bronchitis and fever. The attack would come on suddenly, and the distress was so great that bleeding had to be performed, the effect of which was that, soon after, a copious eruption, often combining the lichenous and squamous forms, made its appearance with complete relief of the chest. In some of these patients, on the day before the eruption, the stethoscopic signs had been those of the most intense mucous irritation; and yet, when the skin disease appeared, the respiration became either perfectly pure, or only mixed with an occasional rhonchus in the large tubes. The same gentleman has observed the reverse of this; as when a syphilitic eruption has been repressed, the bronchial membrane became much affected, and the patient suffered from general febrile symptoms. These phenomena subsided after bleeding and mild diaphoretics, which had the effect of restoring the cutaneous eruption.

The more chronic forms of syphilitic bronchitis with which pneumonia is sometimes combined has been more fully described by Dr. Graves. Debility, night sweats, emaciation, nervous irritability, and cough and broken rest at night, associated with syphilitic disease, such as periostosis, sore throat, and eruption on the skin, indicate that the patient is labouring under a syphilitic cachexy

affecting the lungs as well as other parts. A cautious use of mercury in such cases will soon improve the patient, whose amended looks are ultimately followed by a removal of lues, the cough, and pectoral affection at the same time. We cannot, however, be too careful in our attempts to establish a correct diagnosis before we begin the mercurial course, remembering, as we must, how prejudicial this treatment would be in a scrofulous habit with tuberculous predisposition or incipient irritation of pulmonary tubercles.

Treatment. — The preceding description of the causes of chronic bronchitis, which to some may seem to be rather prolix, will serve not a little to guide us in our views of the proper *treatment* of this disease. This, it must be obvious, will vary with the nature of the case, as modified by cause, duration, and intensity of the symptoms. If these latter indicate that acute has supervened on chronic bronchitis, recourse must be had at once to the remedies called for, and already specified as applicable to the former. Commonly, however, venesection is not required in the chronic form of bronchitis, unless the patient be of a full and robust habit, and greatly jarred by the cough. Nor is local bloodletting, although a safer remedy than general in most chronic local maladies, necessarily required, unless to relieve a temporary but distressing exacerbation or evident congestion. When called for, it is best done by leeches under the clavicles, or cups between the shoulders. In case of doubt, I consider it the safest practice to draw blood rather than to abstain. There are cases, of course, such as of delicate lymphatic women, and puny children of scrofulous habit, who are frequently subject to bronchitis, whom it would be clearly improper to bleed. But that other large class, viz., of labouring men in town and country, who have had abundant nutriment and used spirituous and malt liquors, and of young persons of both sexes ‘ who have neglected their colds,’ will be materially benefited by the abstraction of blood in the manner last prescribed ; or if the means for this are not at hand, by a small bleeding from the arm. The circulation is thereby equalized by the abatement, if not removal, of the congestion, and the susceptibility to the other remedies is thus more completely awakened. These are, in the first place, purgatives, and then antimony or mercury with opium, according to the degree of excitement. Chronic bronchitis is so often associated, at least in our climate, with gastro-hepatic derangement, and a torpid or irregular state of the large bowels, that purging may well precede the alterative and tonic course with which, in conjunction with counter-irritants, the treatment is usually completed. Calomel and jalap, or calomel followed by the compound powder of jalap; pills of the compound extract of colycynth and calomel, sulphate of magnesia with wine of colchicum, will represent the purgatives more immediately required. After this, I have been in the habit commonly of prescribing the blue mass with hyosciamus, or with ipecacuanha, in pills twice or thrice a day, according to the trouble which the cough gives — attention being paid to keep the bowels open, and to suspend the prescription

if there is any evidence of the mouth becoming touched. I have seldom seen benefit from salivation, or any approach to it in chronic bronchitis, except in one, and that a somewhat peculiar case, in which *three* grains of the blue mass, united to hyosciamus, caused copious salivation, and cured the patient. She had given me notice of her peculiar liability to the sialogogue operation of mercury. In milder cases a single pill of the blue mass, three grains with half a grain or a grain of ipecacuanha at night, and a teaspoonful of salts in the morning, will exert a salutary effect in removing the cough, and giving the secretion a healthy character. Where the disease is more paroxysmal, the fits of coughing being violent, and febrile irritation manifesting itself every evening, calomel and tartar emetic; one or two grains of the former and a sixth of the latter three times a day, with the addition of opium, if the bowels are loose or irritable, will sometimes be required. If relief is not procured in a few days by this course, we must substitute for it the use of colchicum and digitalis, provided that the disease be still accompanied with febrile symptoms, and a feeling of tightness of the chest, and difficult expectoration. Camphor mixture will form a convenient and appropriate medium for the administration of the colchicum wine, which will be given in doses of half a drachm to an adult twice a day; or thirty drops, if combined with tincture of digitalis, in a dose of four drops given at the same time. In walking cases, wine of colchicum seeds, in doses of ten to twenty drops, three times a day, with, in the evening, five to ten drops of laudanum, is one of the best remedies with which I am acquainted. It serves, in addition to its direct effect on the bronchia, to relieve these indirectly by keeping the bowels in a soluble state. After the regulation of the digestive system, our attention should be directed to the renal secretion, which is at all times not a little influenced by the function of the lungs, as it, in its turn, modifies this latter. I have found a three-grain pill of the blue mass at night, and a moderate dose of the vinous tincture of colchicum on the following morning, and both repeated for some days, to have a very good effect. Where we anticipate a salutary operation through the kidneys, the hydriodate of potassa will be serviceable, and should the more readily be enlisted in the treatment, if the habit of body of the patient be strumous, and he exhibits any evidence of tubercular predisposition, which should indispose us from prescribing mercury.

If, in despite of these remedies, the disease still persists, with an absence of all the remains of acute disease or of febrile irritation, and exhibits a purely chronic character, with profuse perspiration, cool skin, soft and rather feeble pulse, and a moist or slightly loaded tongue, the treatment should be changed to one of a tonic kind, and the use of the balsams. Calumba and cascarilla, with nitric acid or sulphate of quinia, sarsaparilla, and taraxacum extract, are useful. The balsam of copaiba is recommended by Dr. Armstrong, in very warm terms, in those cases of profuse expectoration without much vascular excitement. Other practitioners and writers of authority and

experience do not sanction his praises. Like my friend, Dr. La Roche (*North American Med. and Surg. Journ.*), I have found it in some instances of marked efficacy. In others it offends the stomach, and has little or no influence. It is best given with some spirits of nitre, and occasionally I add the bicarbonate of soda; and, from my own experience, I should add, as when I spoke of its use in chronic laryngitis, with the addition of compound syrup of sarsaparilla and a minute portion of iodide of potassium. In purely asthenic cases, in which there is a languor of the functions of digestion and circulation, the iodide of iron serves a good purpose.

But at the very outset, or at least after bloodletting, if this be thought advisable, and purging, counter-irritants should be employed in conjunction with the remedies already indicated. It may happen, in fact, that, owing to a weakness of stomach and intolerance of almost any kind of internal medicine, or to the peculiar circumstances in regard to the occupation of the patient, or tender age, as in children, our main reliance must be on external or counter-irritation to the skin. To carry this out successfully we may direct friction of the chest with an oily liniment, containing various proportions of tartar emetic, tincture of cantharides, the essential oils, ammonia, acetic acid, or a diluted mineral acid, according to the degree of effect desired. This combination will represent the liniments which quack physicians and medical quacks laud in books and newspapers as their own discovery, and as endowed with peculiar and specific powers. A succession of small blisters applied in the French fashion, or as flying blisters, may be substituted for the liniment. In milder cases, again, a warming plaster, composed of pitch sprinkled over with a little powdered cantharides, or even a mercurial plaster will answer.

Auxiliary to other treatment is the inhalation of various vapours, simple and medicated, and of gases, in chronic bronchitis. Having ascertained that the larynx and glottis are free from any inflammatory irritation, it may be occasionally worth while to have recourse to the inhalation of balsamic and stimulating vapours, in cases particularly of a phlegmatic habit, and in which the bronchial profluvia is considerable. Gases, and substances of a more decidedly irritating nature, are better diffused with watery vapour through the air of an apartment, or small closet even for the purpose. In this way iodine, and even chlorine, might be used with benefit; a few grains of the former, or a solution of the chloride of soda or of lime being placed in a saucer floating on hot water. As relates to all the kinds of vapour and modes of applying it, the physician will watch if there be increase of cough or acceleration of pulse in consequence, and regulate the continuance of the remedy accordingly. I may refer to my remarks on this subject in a preceding lecture on chronic laryngitis, and to my work on *Baths and Mineral Waters.*

A knowledge of the peculiar circumstances under which chronic bronchitis has come on, will of course modify our treatment; as where it has a syphilitic origin, or appears in a gouty diathesis, or

is associated with chronic gastritis. Of this conjunction I have already spoken in such a way as to indicate the appropriate remedies. If bronchitis be one of the sequences of syphilis, we may shape our treatment accordingly, even though we have not recourse to mercury. In cases in which the habit of the patient is scrofulous, and the predisposition to pulmonary tubercles obvious, iodine and sarsaparilla, and the narcotics, should take the place of mercury. The simple bitters and quinia, or some chalybeate, will advantageously complete the remedial course, part of which should consist of the tepid and warm bath, according to the degree of excitement prevailing at the time.

The diet in chronic bronchitis will be regulated very much by the state of the stomach. If this organ be in a state of irritation, or of actual phlogosis, the food will be of the simplest and blandest kind. On the other hand, where the tongue is moist, the stomach free from disease and the bronchia from congestion, the cough, will not forbid a stronger diet — particularly in old persons, whose powers of digestion may be habitually good. There are instances in which a moderate repast of solid food has allayed the cough, which had been aggravated by an empty stomach. In the case of infants, it is desirable that they should be able to procure at once milk from the breast, either of the mother or a good wet nurse. Farinaceous and milky food, commonly recommended to adults in the chronic stage of pectoral affections, is not equally well adapted to all. There are some whose stomach is so constituted that they cannot, without much inconvenience, indicated by weight at the epigastrium, foul and white tongue, and headache, use a milk diet. Others with whom it agrees, and by whom it is readily digested, are with difficulty persuaded that, in conjunction with farinaceous matters and vegetables, it can furnish ample nutriment to their frame. Such persons regard milk in the light of a ptisan, perhaps a panacea, which is to eradicate their disease; and at table as meant to be an introduction to more substantial and sapid food, of animal kind. They obey the doctor's injunction, to take milk *at* breakfast and *at* dinner; but they do not understand him to mean *for* breakfast and dinner; and hence they contrive to finish off with coffee, and hot bread and butter, perhaps cakes also, at the former meal; and fish with wine sauce, calves head, and other made dishes, at dinner. I do not now sketch from fancy, but from sober observation. The inference to be drawn for our immediate instruction is, that, in every case, the dietetic directions should be precise and definite, so as to leave nothing to conjecture and misinterpretation.

Often by a review of the food taken at the preceding meal, aggravated cough some hours afterwards will be prevented for the next day. The origin of an evening paroxysm is often of this nature. At all times it will be found that a patient who wishes to pass a tranquil night, must avoid either a heavy or a late, even though a light, supper. There are some persons so constituted that the common functional excitement of digestion will affect the

bronchia, and give rise to a sensation of heat and altered secretion with cough: they ought, consequently, to have chymosis at least completed before they retire to rest for the night.

Completeness and regularity of the digestion demands our attention in chronic bronchitis, and hence the function of the lower bowels must be carefully watched. In fact, from the beginning of the treatment of the acute form of the disease to the termination of the chronic, and during convalescence, this is one of the prime indications of cure and health. If the bowels are tardy in their peristaltic action in this latter period, we endeavour to quicken and give tone to them by the combination of purgatives and bitters; one of the best and most convenient of which is aloes and quinia; or extract of gentian and rhubarb. Ripe and dried fruits often answer the double purpose of affording, in conjunction with bread, a light and wholesome nutriment, and of keeping the bowels in a soluble state. The *cure de raisins*, ripe grapes eaten in considerable quantity for several weeks, together with good wheat bread, and nearly the sole diet, is a popular remedy on the continent of Europe in many disorders. To the one before us it is well adapted, particularly in patients who labour under a slight febrile excitement or an irritability which precludes as yet either tonics or stimulating food.

The more protracted and obstinate cases of bronchial inflammation will often be either entirely cured or materially relieved by the use of certain mineral waters—a selection of the kind of which will depend very much on the complications of the diseases of other organs with those of the bronchia. If the skin has been long affected, and the irritation has disappeared, or the eruption dried up; if the liver and bowels have been torpid, the stronger sulphur water will be preferred — such as the White Sulphur Spring of Virginia. Dr. Graves speaks in high terms of sulphur in chronic bronchitis. (*Graves and Gerhard's Clinical Lectures*, 1842.) Mere acidity and irritation of the stomach being the accompaniments, the water of the Sweet Spring will suffice. Cough with febrile excitement and evening paroxysms, and a greatly accelerated pulse, has been often completely and speedily removed by a course of the waters of the Salt Sulphur. One or other of these waters, and the tepid or warm bath, and inhaling the pure mountain air of the region of Virginia, in which they are situated, have restored many invalids in the advanced stages of bronchitis, whose cases were supposed to be of pulmonary consumption. (Bell, *op. cit.*)

In mentioning pure mountain air as one of the restorative agents in chronic bronchitis, I would not be understood to recommend it in all cases. So far from such a recommendation holding good, there are varieties of the disease in which a *reduced* air, such as that of low grounds, and charged with moisture, is of paramount importance as a curative agent. In the dry tracheal and bronchial affections this kind of air is most serviceable; and to breathe it habitually patients resort, as a winter residence, to Pisa and Rome in Italy; or to Norfolk, Savannah, and Augusta, in our own country. Those patients who are annoyed by copious expectora-

tion, and whose system is rather torpid than otherwise, will be told to give Naples and Nice, in the old world, and St. Augustine, in the new, the preference. But although different in the hygrometric states of the air, there must be a general resemblance on the score of temperature among the chosen locations for the winter residence of the invalid who suffers from irritation and other diseases of the air-passages. Although cold is most to be deprecated, yet a very high heat is also injurious. Temporary exposure to a cold, or to a cold and moist air, or to currents of air, should be sedulously avoided by the invalid. With this view, as well with that of procuring a uniform temperature and moisture of the air, neither of which can be done in our houses heated by fires after the common fashion, it has been proposed to keep the patient, with chronic bronchitis or incipient phthisis pulmonalis, in apartments warmed by heated air conducted through flues. It is easy, by having large vessels of water in the hot air-chamber, to preserve the requisite moisture of the air which is sent up, after being heated by the furnace below, into the rooms above. I am very sure that many persons who are habitual sufferers from catarrhal affections of various degrees for nearly half the year, might entirely escape them by having their houses warmed in the manner just stated. Neither they, nor the more formally recognised and treated invalid, would be precluded from the advantage and enjoyment of exercise in the open air during the winter months; only in the case of the latter this should be taken with a nicer selection of sunny days and noontide hours, and when the southerly wind prevails.

The *prevention* of chronic bronchitis will consist in giving the requisite tone to the skin, in the avoidance of great vicissitudes of temperature, particularly when the body is perspiring freely, and in maintaining a regular digestion. The skin is rendered much less impressible from sudden atmospherical extremes, by sponging the surface daily with salt and water, and friction for some time afterwards with dry towels. A more circumscribed ablution even, as by sponging the chest and neck every morning with vinegar and water, or salt and water, has been found to be a capital preventive, especially when followed by dry rubbing for some time. The undue sensibility of the cutaneous function, by which, in one person, bronchitis, in another rheumatism, is brought on, is greatly diminished by sea-bathing. The precautions and the associated circumstances to be attended to in visiting the sea-shore with this view, have been detailed in my work on *Baths and Mineral Waters*. At all times the skin should be guarded by an inner garment, of such a texture that it is at the same time a bad conductor of caloric and an absorber of the fluid perspiration. On this account flannel or woollen wove, or silk-jackets, should be worn in winter, and domestic muslin or cotton flannel in summer. There are many individuals whose liability to fluxions of the bronchia or bowels, or to rheumatism, is such, that they cannot at any season dispense with flannel. In all cases, the inner garment ought to

be changed night and morning; and the invalid, before putting it on, should use the flesh-brush, or some analogous means of active friction of the skin.

In directing the prophylaxis for the benefit of children, we cannot but deplore the exceeding blindness of parents to consequences, and the too general indifference of physicians to the philological law respecting the evolution of animal heat, when we see the fashion of the dress of these little beings. They who have less ability to create animal heat, and whose bodies, in consequence, are less able than adults to resist the morbid impressions of cold and moisture, are cruelly exposed to attacks of croup and bronchitis by their breasts and shoulders, and the greater part of their arms being deprived of all covering in-doors, and often not properly protected when in the open air. But the chief mischief is in the house, — between the different rooms of which there is often as great a contrast in temperature as between summer and winter. Add to exposure, by transitions of this kind, that in entries, and the occasional detention of children at open doors in the arms of nurses and mothers, during all which time the skin of the chest in front, and between the upper part of the shoulders behind, and even of the armpits, is acted on by cold, and by cold and moisture, and we find a cause, the chief cause, of so many attacks of croup and bronchitis. We need hardly inquire for the often additional ones of cold and damp feet, and chill by detention, without active locomotion, in the open air.

LECTURE LXV.

DR. BELL.

NARROWING AND OBLITERATION OF THE BRONCHIA.—DILATATION OF THE BRONCHIA.—Organic changes in the tubes and air-cells—Thickening, the first change—Symptoms, difficulty of inspiration—Obliteration of the bronchia with shrunken pulmonary tissue—Dilatation of the bronchia may occur very early in life—Causes, prior diseases—Symptoms analogous often to those of phthisis pulmonalis—Differential diagnosis between these two diseases, its great difficulty.—*Treatment*,—nearly the same as for chronic bronchitis.—*Ulcers of the bronchia*.—DILATATION OF THE AIR-CELLS.—PULMONARY OR VESICULAR EMPHYSEMA.—Dilatation and rupture of the air-cells—Symptoms equivocal—Disease often begins in early life,—constitutes a variety of asthma.—DRY CATARRH—ASTHMA.—*Bronchial congestion*, a preferable term—This with pulmonary emphysema constitutes mainly asthma.—*Treatment*—Mild aperients, alteratives—The alkalies—Regulation of diet.

NARROWING AND OBLITERATION OF THE BRONCHIA.—DILATATION OF THE BRONCHIA AND ENLARGEMENT OF THE AIR-CELLS. — There are other changes in the bronchia resulting from inflammation, than those which occur in the mucous membrane. These are attended with opposite symptoms in different cases. As chiefly referrible to chronic inflammation of the bronchia, they might have

been described under this latter head, but for the suspension which some of you may think has been already too great by pathological inquiries before I reached the subject of treatment.

Considered in relation to bronchitis, the organic changes in the tubes and air-cells are enumerated, by Dr. Stokes, as follows: —

1. Narrowing of the calibre; obliteration.
2. Dilatation of the tubes.
3. Ulceration destructive of the tubes.
4. Enlargement of the air-cells.
5. Atrophy of the lung.

The most simple change of structure of the bronchial tubes is a mere thickening of the mucous and the sub-mucous membranes, which generally in some degree accompanies acute inflammation. This is accomplished by an increased secretion of soft lymph, which, as the inflammation subsides, is eliminated and expectorated with the mucus of the membrane; or if it have been effused in the cellular and parenchymatous tissue, it is after a while absorbed. But it is otherwise when the inflammation recurs frequently, or is of long duration; for it then causes an effusion of a less absorbable nature, involves the less vital structures, and as the changes induced are slow, so they are more permanent, because they become identified, with the nutritive or reparative functions of these tissues. There will then be produced a degree of hypertrophy of some or all of the various tissues composing the tubes. Nothing, says Dr. Williams, is more common than to see the air-tubes of persons who have long suffered from bronchitis presenting an undue development of the longitudinal elastic fibres; whilst in other cases the outer cellular coat of the larger bronchia is thick and indurated, and their cartilages are sometimes partially ossified. Any of these changes has the effect of rendering the lungs less easily expansible in respiration; the first in particular is a common cause of the short breath, which persons frequently affected with bronchitis generally manifest; and although not often serious in itself, yet it may so abridge the sphere of the function of respiration as to make its increased exertion on bodily exercise a matter of difficulty and disorder, and to render it illy able to bear any other attacks of disease, to which the lungs can in general adapt themselves by supplementary effort. Thus, when one portion of a healthy lung is attacked with pneumonia, or compressed by pleuritic effusion, its function is supplied by the increased and quickened movements of the other portions, which, in their natural state, are equal to this augmented task; but if their pliant elasticity be impaired, and their size more fixed by an increased stiffness, they will also be, in proportion, less available for additional exertion, and the body will suffer the more from the crippled state of the function.

The chief symptom of hypertrophy of the longitudinal fibres, and of increased rigidity of the tubes generally, is *difficulty of inspiration*, which is short, quick, and performed with an effort, especially on making any exertion; whilst the expiration is comparatively

easy; but both acts are often accompanied by wheezing sounds, from irregularities in the calibre of some of the tubes, and frequently from partial congestions or inflammation, from which tubes thus diseased are rarely free. The vesicular murmur is impaired, and the expansion of the whole chest is perceptibly limited. These symptoms resemble those of spasmodic asthma, except that they are permanent, and are not removed as the latter may be for an instant on breathing after holding the breath. As the bronchia cannot be narrowed without the sound caused by the entrance of air into these tubes being also changed, there results a peculiar rhonchus or rattle, on auscultation, which, in consequence of its seat and nature, is called by M. Andral the dry bronchial rattle or *râle*, the two principal varieties of which were denominated by Laennec sibilant and stertorous. This *râle* is evidently owing to the air in its way to the pulmonary vesicles, traversing tubes which are narrower than those which usually give passage to it. In its exit from the vesicles, the air again finds the same obstacles to its free passage, which causes, during expiration, the *râles* or rhonchi already mentioned. Sometimes they are only heard during expiration.

In reference to *obliteration of the bronchia*, the following considerations merit notice. If we follow the bronchial ramifications from their origin to the pleura, we shall observe an approach to transformation from mucous to serous membrane, or at least a decided tendency to it, which increases as we approach their terminations. In the larger tubes we find a vascular mucous membrane endowed with villosities and glands, but, as we advance into the substance of the lung, this tissue gradually loses its original characters, until, at its ultimate point, if it be not completely serous membrane, it closely approaches to it in appearance and function. It has been remarked by M. Reynaud, as quoted by Dr. Stokes, that we may expect to see the plastic inflammation the more the affected tissue approaches to the white structure; and here is a cause of the greater liability of the minute tubes to obliteration.

In all cases except where the tube was extremely minute, it has been found, that, just at the commencement of the obliteration a cul-de-sac existed, beyond which the tube was converted into a solid fibrous cord, furnishing also ramifications which answered to the originally pervious tubes.

As might be expected, those parts of the lung to which the obliterated tubes extend, have been found to present a shrunken appearance. In the neighbourhood of the obliterated canals, however, the air-cells were frequently found dilated, while in other instances the tissue was dense and impermeable.

Obliteration of the bronchia has been met with as a chronic or an acute affection. As a chronic disease it will be frequently found in connexion with tubercle. It is, continues Dr. Stokes, an interesting fact, that it occurs much more frequently in the upper than in the inferior portions of the lung, and its connexion with the de-

velopment and phenomena of tubercle is too obvious to be overlooked. Dr. S. has little doubt that, in many cases of pulmonary disease, the pent-up secretions of the air-cells represent, in some cases, the acute granular tubercle, and in others, where the affection is more general, the suppurative pneumonia.

Although we should admit that the minute bronchial tubes or excretory ducts might be plugged up by secretions of the cells, independently of inflammation in the parietes of the tubes or cells, yet we cannot help looking on the obliteration as principally the result of an inflammatory process.

Dilatation of the Bronchia.—This state of the bronchial tubes deserves attention, not only on its own account, but also because it sometimes produces physical signs similar to those of phthisis; such, for example, as the mucous rattle or *râle*, and the gurgling sound similar to those from tuberculous cavities. Auscultation, also, apprises us of pectoriloquy. For the better exhibition of the bronchia in autopsic examinations they should be laid open, from their large to their small branches, with a pair of scissors. Sometimes the dilatations are pretty uniform through some length of a tube. In other cases they form irregular roundish cells or pouches, freely communicating with each other, and from which tubes of unchanged size here and there arise. The tissues composing the tubes are, generally at the time, more or less altered. They are least so in the tubular form of dilatation, in which the coats are often quite thin, and the longitudinal fibres are distinct, although occasionally enlarged. But in the more globular dilatations, the walls of the tubes are generally much altered. They are irregularly thickened; the thickening being formed in part by hypertrophy of the mucous or sub-mucous tissues lining the cells, which sometimes form folds of wrinkles around the tubes, and partly by a dense tissue on their outsides, probably consisting of the parenchyma of the lung compressed by the encroaching tube. There is little or no trace of the longitudinal or circular fibres in this form of dilatation, and the lining membrane is generally in a softened state, and of a red colour, whilst there may be considerable rigidity in some parts of the tubes. For detailed views of the pathology of dilatation of the bronchia, I must refer to Dr. Williams's and Dr. Stokes's works already so often quoted.

This disease may occur at all ages, from two months and upwards; and, indeed, there is reason to believe that it is sometimes congenital and a predisposing cause of pulmonary disease. As repects its duration, we may regard it under three different aspects. First, a dilatation may occur to a great extent in a comparatively short time. This has been chiefly observed in young children affected with hooping-cough, in whom the period of two or three months is sufficient to produce the fullest development of the disease. In the next class are those cases in which a bronchial irritation has continued for many years in certain cases, indeed for the greater part of the life of the individual, during periods varying from four, five, and six, to

twenty, forty-one, and fifty years. Finally, we have this organic change as a common accompaniment of the tuberculous disease of the lung, and of course the period of duration is various. Dr. Williams describes one manner, among others, in which the bronchia become dilated. In the disease called pleuropneumonia the lung is inflamed, and at the same time compressed by an effusion in the sac of the pleura. Now, if it remain long in this state, the smaller air-tubes and cells become obliterated by the adhesion of their sides, so that when the liquid is removed from the pleura they will not expand again with the enlargement of the chest: but the large and middle-sized bronchia are not obliterated; they bear the whole force of the inspired air, and become consequently dilated by it. This kind of dilatation is usually conjoined with contraction of the affected side.

The *symptoms* produced by dilatations of the bronchi will be according to the extent of the lesion. Slight degrees of it are met with in the bodies of persons who had not during life manifested any prominent disorder of the respiration; and its simpler forms may exist to a greater extent without producing any other effect than a liability to attacks of bronchitis. But where it affects many tubes, has modified their structure, and has enlarged them to such a degree that they press on and obliterate a considerable extent of the pulmonary parenchyma, it then causes habitual dyspnœa, with more or less cough and muco-purulent expectoration, which is often remarkable for its fetor. There are, generally, present also the ordinary symptoms of severe chronic bronchitis, for which some parts of the affected tubes are scarcely ever free; and the permanency of these symptoms, together with a degree of lividity, dropsical effusions, and cachectic condition, often induced by the crippled condition of the lungs, forms the usual general character of the aggravated forms of dilated bronchia.

Now, you may say, continues Dr. Williams, whose language I have just been repeating, that these symptoms look very like those of consumptive disease: and so they well may; for there is injury to the function of respiration, profuse expectoration, hectic fever, and the patient is often slowly wasted away. In their aggravated forms, dilated bronchia are not more tractable than tubercular consumption itself; but their tendencies and constitutional effects are different, and merit as much of a distinction as our means of diagnosis can find for them. Unfortunately this is not one of a very marked kind; in fact it is to be made only by those much experienced in diagnosis; and even they will give it in terms rather of probability than of certainty. Dr. Williams thinks that the situation of the part from which the sounds in auscultation are perceived, will help to guide us in our opinion: in phthisis it is chiefly in the superior parts, but in dilated bronchia in the middle regions of the chest. The character of the sounds in relation to time is of value also; those in phthisis tending to increase and spread as the excavations proceed, whilst those of dilated bronchia remain nearly

stationary for weeks and months. In the former disease the sound on percussion is more extensively dull, especially under the clavicles; whereas in the latter, if any dulness exists, it is generally in the mammary, lateral, or scapular regions of the chest, and is often accompanied by a sound of a peculiar kind. This is hollow and tube-like, and from its resemblance to that produced by mediate percussion on the trachea, or by tapping with the finger on the mouth of a small vial, Dr. Williams has given it the name of *tracheal* or *amphoric*. A notion of it may be conveyed by filliping on a finger pressed on the larynx or trachea, or on the cheek, when the mouth is opened in the manner of sounding the letter O. This sound depends, not essentially on the vibration of the walls, as in the case of the ordinary sounds of striking the chest, but on that of the air in the tubes or cavities, which give a note, according to their length and size, precisely in the manner of a pan-pipe, or of an India rubber bottle.

Where the differential diagnosis is so important as that between phthisis and any other disease, I have no hesitation in repeating the very luminous summing up of this subject in the words of Dr. Williams.

Finally, says this gentleman, you will be better able to distinguish dilated bronchi from phthisical cavities, when you become fully acquainted with the signs and general symptoms of the latter; and I shall now only add, by way of recapitulation, when you meet with a case in which long continued cough, with purulent expectoration, dyspnœa, loss of flesh and strength, hectic fever, even with some of the physical signs of cavities in the lungs, beware of pronouncing it to be tubercular, if qualified by all or most of the following conditions: — If no proofs of a scrofulous habit can be traced; if the complaint have originated in a long-continued and violent cough, or in an attack of pleuropneumonia, and, considering its duration, emaciation have now proceeded very far; if the purulent expectoration have been fetid and sanious rather than flocculent or caseous; if the bronchial or cavernous respiration, voice, or gingling, be heard rather in the middle than in the upper portions of the chest, and be there spread over a considerable extent of surface; if these middle portions chiefly sound differently on percussion, being dull when the rest of that side sounds pretty well or amphoric when the side is generally dull and contracted; and if, although the cough and expectoration continue undiminished, these signs remain stationary for many weeks together.

After all, however, some of the most skilled auscultators are at a loss what diagnosis to form in certain cases of dilated bronchia. M. Andral presents the outlines of a case of *chronic bronchitis with dilatation of several bronchi, pectoriloquy, and ulceration of the stomach*, in which the diagnosis, according to Laennec, under whose care the patient came, was beyond doubt that of pulmonary phthisis. The nature of the sputa and the pectoriloquy seemed to indicate that cavities were already formed.

In general terms we may say, with Dr. Stokes, that *in phthisis we have first dulness, and then cavity; while in dilated tubes we have first cavity, and then dulness.* But, he adds, the bronchial tubes may be sufficiently dilated to give pectoriloquy and bronchophonia without any dulness; proof of which he gives in a case furnished by M. Louis, who supposed his patient to labour under an organic disease of the abdomen, and a chronic and circumscribed phthisis; whereas, in fact, the organic lesions were dilated bronchial tubes, in both sides resembling a series of cysts.

Of the *treatment* of dilatation of the bronchial tubes little can be said. We have no remedies of admitted efficacy to control this morbid condition. A useful lesson is derived, however, from this disease, in favour of early and active measures for its prevention. These will be the same as those already indicated for chronic bronchitis, of which dilated bronchial tubes is sometimes one of the effects, and occasionally one of the associated symptoms also. Hence we must go a step farther back, and endeavour to arrest the first inflammatory attacks, which, if neglected, will end in chronic bronchitis and dilated bronchia.

Ulcers of the bronchia seldom occur but in connexion with some peculiar cause which tends to fix inflammation on the bronchial mucous membrane, such as the habitual inhalation of irritating particles of dust, in various trades; the continued passage of tuberculous matter in phthisis, and occasionally the specific influence of measles, small-pox, and syphilis. We are ignorant of any symptom by which the presence of ulcers in the bronchia can be distinguished. It is worthy of remark, however, that they rarely exist without a similar affection of the larynx; in which case the voice is impaired, or lost; but then, again, this happens commonly when the bronchia are not ulcerated, or only so far as to give vent to the matter of vomicæ in phthisis.

Dilatation of the Air-cells. — Pulmonary or Vesicular Emphysema. — The former of these titles is that given by Dr. Stokes, the latter by M. Laennec, to a morbid state of the air-cells of the lungs, accompanied with enlargement of the viscus and increased quantity of air in the thorax. The anatomical characters of the disease are, according to Laennec, augmentation of size and less uniformity of the air-vesicles. The greater number equal or exceed the size of a millet-seed, while some attain the magnitude of hempseed, cherry-stones, or even French beans. The latter are probably produced by the reunion of several of the air-cells through rupture of the intermediate partitions; sometimes, however, they appear to arise from the simple enlargement of a single vesicle. The largest of these dilated cells are often, in no respect, prominent on the surface of the lung; sometimes they form a slight projection. The dilatation is greatest at the base of the lungs and upon the internal surface.

So far the air is contained in its proper cavities, which are excessively, permanently, and unnaturally distended; but if the dis-

tension becomes still greater, the air-cells are ruptured in certain points, and we have that other variety of pulmonary emphysema in which the surrounding cellular tissue of the lung is infiltrated with air. The surface of the pulmonary vesicles is in such cases of an irregular form, which is made to vary by pressure on them with the finger. Louis believes the vesicles to be hypertrophied.

Sometimes, but comparatively seldom, there is a combination of this last state with a true emphysema of the inter-lobular cellular tissue; but this is generally very slight.

Waiving inquiries into the probable causes of dilatation of the air-cells, it is most important for us to know that this disease is, not so often as supposed, a result of bronchitis; but that its prevention, alleviation, and cure, depend on circumstances as yet not fully appreciated. According to Louis, we uniformly find that the extent and degree of the emphysema are always in direct proportion to the age of the patients; or, to what, in an extremely chronic complaint is the same thing, the duration of the disease. Nearly all the subjects of the asthma which Laennec calls dry catarrh, exhibited, on examination after death, a greater or less dilatation of some of the bronchial cells. An occasional cause is worthy of notice: it is a long retention of the breath, as in the case of players on wind instruments, and those who have to overcome unusual resistance by great bodily effort, as in lifting, pushing, and pulling.

Both the general and local symptoms of this disease are rather equivocal, at any rate in its slighter forms. Patients labouring under this disease are affected with an habitual dyspnœa, which, in the earlier periods, is often mitigated in summer, to return with violence during the winter: they are, also, liable to repeated attacks of what may be termed *congestive* bronchitis, during which the difficulty of breathing becomes extreme. The secretions are more frequently scanty, viscid, and unelaborated in the dilatation of the air-cells than in that of the bronchial tubes. Repeated returns of acute catarrhal attacks in this state of the air-cells gives rise to most of the phenomena of dry asthma, the paroxysms of which are accompanied by extreme oppression. In the fixed forms of this disease the physiognomy is almost characteristic. Dr. Stokes, who makes this remark, draws directly afterwards a portrait of a patient affected with it, which is certainly distinguished by remarkable and distinctive traits, although it is too highly charged to be a representation of the majority of persons suffering from dilatation of the air-cells. The complexion is generally of a dusky hue, and the face, although anxious and melancholy in its expression, is preternaturally full, when contrasted with the rest of the body. The nostrils are dilated, thickened, full, and vascular. The lower lip is enlarged, and its mucous membrane everted and livid, giving a peculiar expression of anxiety, melancholy, and disease to the countenance. The shoulders are elevated and brought forward, and the patient stoops habitually, — a habit contracted in his various fits of orthopnœa and cough, by the relief experienced from inclining the

body upwards. The apices of the scapulæ are remarkably projected; and anteriorly the clavicles are arched and prominent; the sternum has lost its flatness or its relative concavity, and it is thrown forward and even arched both in a longitudinal and transverse direction; the intercostal spaces are widened but not dilated, as in empyema. When we examine the sides, however, we see the intercostal spaces deeply marked, and presenting no indications of protrusion; so that, if we compare the diseases of dilatation of the cells and empyema, with respect to the external conformation of the chest, we find that, in the first, the appearance of smoothness and dilatation is most evident superiorly, while in the latter the reverse occurs. The lateral portions of the chest are remarkably deep, and their convexity not at all proportioned to that of the anterior or posterior portions of the thorax.

On applying the hand to the inferior sternal region, we generally find that the heart is pulsatory with a violence which we should not expect from the examination of the pulse at the wrist, which is often small and feeble, whilst the impulses of the right ventricle are given with great strength. These phenomena are generally owing to a hypertrophied state of the right cavities of the heart which so commonly attends this disease, a state so frequently accompanied with a violent impulse and a feeble pulse. Two other causes may exist for the production of this symptom without supposing a disease of the heart; and these are displacement of the heart by the dilated lung, and a congested and enlarged state of the liver.

This disease begins frequently in infancy, and may continue a great many years. It does not always prevent the subjects of it from attaining an advanced age; although it must be admitted that it will seriously complicate and give additional power to other diseases. Of all the varieties of asthma, it is unquestionably, in the opinion of Laennec, that which affords to the patient the best prospect of longevity. Louis tells us, that it alone never causes death.

The *physical signs* of dilatation of the bronchial cells are a morbidly clear sound on percussion corresponding to the part of the lung affected; and inaudibleness, or nearly so, of the respiratory sound in auscultation. Sometimes, during coughing or violent efforts of respiration, a wheezing or sibilant sound announces that the obstruction is not quite complete: and there will generally be some of the tubes which will give these sounds during common breathing.

Dry Catarrh — Asthma. — Intimately connected with dilated bronchial cells, or rather its frequent precursor and cause, is the *dry catarrh* of Laennec, a few remarks on which will place all the characters of the former disease more completely before us, and will help, also, to enlighten us on the treatment. The anatomical characters of the dry catarrh are swelling, together with an obscure redness or violet hue of the mucous membrane of the lungs. This swelling is most remarkable in the smaller branches, which are indeed sometimes almost completely obstructed by it. They are frequently blocked up by a glutinous kind of matter, of a pitchy

consistence, or somewhat firmer, disposed in globules of the size of hemp or millet-seed. This matter which many persons who do not think they have, expectorate in small quantities every morning. It is called by Laennec pearly expectoration. The physical signs are the same, very nearly, as those of dilatation of the air-cells, which, as already remarked, so generally accompanies this disease.

The term dry catarrh involves a contradiction, since the word catarrh itself denotes a flux or discharge; Laennec, who admits this etymological mistake, has chosen, notwithstanding, to designate in this way those inflammations of the bronchia which are attended with little or no expectoration. The coughs called gastric, hepatic, hysteric, &c., are all, according to this writer, examples of the coexistence of dry catarrh with some affection of the particular organs whence their qualification is derived.

I should prefer the more pathological name, *bronchial congestion*, given to this disease by Dr. Williams. The symptoms of this affection are those rather of asthma than of bronchitis. They vary according to the extent of the affection. In its slightest degree it is presented by those individuals, who, every morning on waking, feel their breath rather short, until they have coughed up a little tough semitransparent mucus. In its severer degrees, that is, when more of the bronchial membrane is affected, the shortness of breathing may amount to a regular fit of asthma, accompanied by cough; and this may last more or less for hours and even days, and be at last relieved by the expectoration of the scanty, tough mucus just mentioned. There is little or no fever or sign of inflammation present; only sometimes a sense of constriction and heat, or rather of stuffing in the chest; but there is often much gastric disorder; the tongue is slightly furred; the uvula relaxed; the tonsils congested; digestion imperfect; the liver inactive; the bowels torpid, or liable to extremes; the hemorrhoidal veins swelled; and the urine turbid. Excesses in diet, the sudden removal of cutaneous eruptions, suppressed gout, and sudden checks given to perspiration, or any other free secretion, occasionally excite this affection. These causes, operating on systems not much disposed to inflammatory reaction, such as those of a torpid habit of body, destroy the balance of the capillary system, and occasion an undue distension or congestion of certain parts of it.

Of the accuracy, also, and practical value of the following remarks by Dr. Williams, I am fully persuaded, when he says:—"This bronchial congestion may doubtless originate sometimes in inflammatory affections of the same part; but, according to my experience, it is more commonly the result of disorders of the digestive or other organs which tend to injure the tone of some or other part of the capillary system. Thus, these will, in some persons, locate this congestion in the capillaries of the face, harming nothing but their beauty; in others the encephalic vessels suffer, whence habitual headaches of an obstinate character arise; in others some part of the alimentary canal is the seat, whence indigestion, hemorrhoids,

or some disorder of the alvine function ensues. So, too, the urinary or the genital organs may become the place of this congestion; or it may fall on the bronchial membrane, and induce the affection under consideration; and the local determination of the morbid vascular condition is, in individual cases, fixed on particular parts or organs in consequence of prior weakness or tendencies."

The *treatment* of dilatation of the air-cells and that of dry catarrh is to be conducted on similar principles. In both there is congestion of the cells, with imperfect and thick secretion. Both are marked in their course by paroxysms of asthma, often of great violence and frequent recurrence, and disorder of the heart, and occasionally other organs out of the chest. The pathology of pulmonary emphysema, and of its common antecedent, dry catarrh or bronchial congestion, is that of the chief forms of asthma, if we except the simple nervous; and must therefore be steadily held in view if we would properly appreciate the directions for its alleviation or cure. Various exciting causes, among the chief of which are cold and indigestion, will bring on an attack of asthma: but the predisposition depends on the habitual state of the mucous membrane and air-cells of the lungs just now described. To the removal of these latter, therefore, ought our efforts to be directed, rather than to the warding off of a paroxysm of simply spasmodic asthma. It must be confessed that our prognosis, as far as relates to a speedy, or, in some cases, an entire cure, of the diseases under consideration, is not very favourable. Our difficulties, however, will induce us to press on all persons the importance of arresting, as soon as possible, those affections which are so often neglected or trifled with, on account of their being 'mere coughs,' or 'common cold,'—'slight influenza,' &c.

Bronchial congestion, although it may have an inflammatory origin, is seldom of such a nature as to require active antiphlogistic measures. Not unfrequently, indeed, I have seen it prevail in persons of a lymphatic temperament, disposed to anæmia, and who could ill bear such a treatment. In place, then, of direct depletion by bloodletting, either general or local, we ought to have recourse to derivation by moderate purging, applications to the skin of tartar emetic, &c., and a due regulation of the secretions by mild aperients and alteratives, with which some of the narcotics, such as hyosciamus, stramonium, or conium, may be usefully conjoined. I have seen in some cases of dry catarrh decided benefit from the prescription of colchicum. There is a class of remedies of which Laennec and other practitioners subsequently have made large use, and on which they have bestowed liberal commendations. I refer now to the alkalies. They are supposed to be efficacious by increasing the flow of bronchial secretion, removing the obstructing mucus already secreted, and attenuating or dissolving the tenacious sputa. In this way they tend to unload and reduce the congested membrane, and thus to relieve the dyspnœa that arises from tumefaction. With Dr. Williams I would say, I am far from wishing to extol chemical medicines in general; but, in the present instance,

we may bring chemistry to our aid, in order to explain the action of alkaline attenuants. We know that we can, by the administration of alkaline medicines, render the urine alkaline, and increase the alkaline qualities of the blood. Now, there is no solvent of mucus more effectual than alkalies, and it is easy to perceive that an alkaline state of the bronchial secretion can scarcely be compatible with the formation of tough, solid mucus. Dr. W. found these remedies very effectual, and he is in the habit of giving either the liquor potassæ (ɱxx. to xxx.), carbonate of soda (gr. xv. to xx.), or carbonate of ammonia (gr. iij. to vj.), according to the character of the case, three or four times a day, with squill, ipecacuanha, or colchicum, and some narcotic, as may be indicated by the general state of the system and the prevalence of particular symptoms. I more commonly myself prescribe the sub-carbonate of potassa, in doses of from three to five grains, with wine of colchicum, thirty drops, in a simple syrup or mucilage, three or four times a day. I have found, in the catarrh of infants of the most tender age, the carbonate of potassa in minute portions, with a few drops of ipecacuanha wine and camphor water and simple syrup, one of the best combinations for promoting a ready secretion and allaying the cough without offending the stomach. The propriety of the addition of laudanum will be judged of by the circumstances of the case. The preferable plan, it has seemed to me, when we desire to obtain positive and appreciable results by the administration of an alterative, such as the alkali, is to continue it at regular and not long intervals for a protracted period; and even to give it in the drink of the patient. It will, therefore, be better to direct opium or one of its preparations, — laudanum, morphia, &c., separately, once or twice in the twenty-four hours, than add it to the alterative; and thereby either interfere with the freedom of administration of this latter, or complicate therapeutical results in such a way as to prevent our telling certainly the effects of the chief article prescribed.

A due regulation of the diet is, of course, indispensable for a cure. To this end all rich, acid, and irritating articles of food should be avoided. Tonics, the best of which are the sulphate of quinia and the sub-carbonate or the muriated tincture of iron, will be advantageously administered, after the other remedies have been used, to abate or remove the congestion. These will then contribute to preserve the balance between the several organs, and to allay the excessive sensibility, both of the bronchial mucous membrane and of the skin. By acting on this latter, we can often more safely remove the irritability of the former surface; and with this view the cold bath has been, not seldom, employed. For adults, whose constitutions are not yet broken down, and in whom congestions of the abdominal viscera are not complicated with those of the bronchia, and who are liable to paroxysms of asthma from changes of temperature or slight exposures to cold, the cold bath offers a means of amelioration, if not of positive prevention, of such attacks. It should be used in the morning.

LECTURE LXVI.

DR. BELL.

HEMOPTYSIS OR BRONCHIAL HEMORRHAGE.—May be called bloody secretion—Is idiopathic or secondary; the last variety most common—*Causes*,—age, inherited predisposition, certain employments, atmospheric exposures, plethora, compression of the chest—Tubercular diathesis and disease the most frequent cause—Next to this diseases of the heart.—Hemoptysis often vicarious—Apoplectic congestion of the lungs, an effect rather than a cause—Explanation of its origin—*Symptoms*—Quantity of blood discharged variable—The physical signs few—*Diagnosis*, not easy—*Prognosis*—*Organic changes of structure*—*Treatment*—Indications, to arrest the discharge and to prevent its return—Venesection to be freely used at first—Attention to posture—First remedies simple,—cold sponging of the neck and chest—Risk of reaction, unless suitable depletion is practised—Leeches to remote parts,—vulva or anus—Active purging—Peculiarity sometimes following the use of leeches—Sugar of lead—Tartar emetic—Blue mass with laxatives—Astringents—Narcotics and chalybeates.

HEMOPTYSIS OR BRONCHIAL HEMORRHAGE. — Appropriately does the consideration of bronchial hemorrhage follow bronchitis, the former being in truth but a modification of the latter; the discharge of blood giving the relief from the inflammatory congestion of the bronchia in one case which the secretion of mucus and pus affords in the other. In hemoptysis the secreting point may be said to be transcended, and blood is exhaled from the bronchial mucous membrane.

This disease is either primary or idiopathic, or it is secondary and symptomatic. An attention to these two distinct varieties will not only influence our prognosis, but also guide us in the treatment. The first is often without danger, curable with ease, and when cured will leave the person attacked in good health, and open to the common chances of longevity. The second variety, associated as it often is with tubercles of the lungs, is of bad augury; not so much on account of the disease of the bronchia, as because it indicates a certain degree of advance of phthisis pulmonalis. The bursting of softened tubercles into the bronchia is often accompanied with a slight hemorrhage, from the rupture of small vessels, which soon stops spontaneously. But, on the other hand, a rupture of a bloodvessel traversing a tuberculous excavation may give rise to losses of blood of much more gravity, and which may even prove speedily mortal. It is only in such cases as these that there is any foundation for the once current pathology of hemoptysis, in making the disease depend on rupture of vessels. For the most part, it is, as already indicated, a true bloody exhalation or hurried secretion from the capillary, exhalent, and secreting vessels of the mucous tissue.

The *causes* of hemoptysis are numerous and diversified. The period of life which predisposes to it are of youth and adult age, or from 15 and 20 to 30 and 35 years. As regards sex, women are more liable than men, in the proportion, according to Louis, of

three to two: their liability is greatest in the period between 40 and 45 years of age. The sanguine and nervous temperaments are the most predisposed. Persons whose parents had suffered from the disease, or were phthisical, or who are threatened with consumption, are in most danger from hemoptysis. This is increased by certain employments, such as of a tailor or shoemaker, which require the body to be much and long bent forward. Sudden variations of temperature, and particularly change to a dry, cold air, are enumerated among the causes of spitting of blood, which is, on this account, more frequent in spring and autumn than at other seasons. The excitement from long exposure to a burning sun has a similar morbid effect in some instances. Maritime exposures, and particularly those to the east winds, is a too frequent cause of hemoptysis, and should be carefully shunned or abandoned by those who are predisposed to its attacks. If elevated regions have contributed to produce the disease, we must attribute the results rather to the cold, and in the case of travellers ascending high mountains, to the great muscular effort and excessively hurried respiration in consequence, than to the rarified atmosphere.

Hemoptysis has supervened on protracted mercurial treatment, the use of iodine, the inhalation of irritating gases; also after strong moral emotions, excessive venereal indulgences, and prolonged vigilance. It may be caused by general or local plethora; the latter induced by ardent spirits, loud and protracted speech, the suppression of an habitual hemorrhage, blows on the chest, or compression of this region. Unhappily the examples of the force and frequency of this last cause are multiplied from day to day by the terrific practice of corsetting, so general among women, both gentle and simple, beautiful and ugly; whether they be attendants on the ball-room or the church, giddy or serious. It is doubtless owing to this cause, that, as M. Andral thinks, consumption is so frequently met with in the other sex.

This author gives the following statement as the result of his own observation, in regard to the relative frequency of the several modes of connexion between hemoptysis and consumption.

Of the persons whom he had known to die of that disease, one in six never spit blood at all. Three in six (or one-half of the whole number) did not spit blood until the existence of tubercles in the lungs was already made certain by equivocal symptoms. In the remaining two-sixths, the hemoptysis preceded the other symptoms of tubercular disease, and *seemed* to mark the period of its commencement.

By this comparative statement you will see how very frequently hemoptysis occurs as one of the symptoms *connected* with tubercular phthisis. Under this physician's observation it happened in five cases out of six. In the experience, however, of Louis, the proportion, though very large, is not quite so great as Andral found it. Among eighty-seven instances of consumption, there were fifty-seven, or four in every six, in which hemoptysis had been present.

Next, as Dr. Watson truly says, to *tubercular* disorganization of the *lungs*, the most frequent source of pulmonary hemorrhage is to be found in organic disease of the *heart*. It has been stated by Chomel, Bouillaud, and others, both in this country and abroad, that the disease in these cases is most commonly situated in the *right chambers* of the heart. But this is certainly a mistake. The error has arisen from arguing upon erroneous analogies, instead of attending to matters of fact. However, the statement is just as little supported by reason as it is by the result of general experience. The only alteration in the right cavities of the heart which we could suppose likely *à priori* to cause pulmonary congestions, and thereby hemoptysis, would be increased strength and thickening of their muscular parietes — hypertrophy; a morbid condition which is comparatively rare on that side of the heart, and which, perhaps, would not suffice for the production of hemoptysis, even if it did oftener exist. The direct effect, on the other hand, of any *obstacle* to the free passage of the blood in the right chambers of the heart, would be to gorge the *liver*, and the system of the *vena portæ;* and to prevent the lungs from receiving their due proportion of blood. But any material obstruction existing in the *left* auricle or ventricle will impede the return of the blood *from* the lungs, lead to its accumulation in those organs, give rise to mechanical congestion, and so dispose strongly to pulmonary hemorrhage.

Hemoptysis is often vicarious of the menses, and recurs under such circumstances with considerable regularity; discharges of this kind are not always incompatible with life, since they have been known to take place for a period of thirty, and even forty years, as in the cases stated by Pinel. Laennec thinks that suppression of hemorrhoids more frequently gives rise to *pulmonary apoplexy*, which is sometimes an immediate and always a serious though far from a necessary cause of bronchial hemorrhage. Pulmonary congestion and the hemorrhage under consideration are not unfrequently dependent on hypertrophy of the heart, and dilatation also of its cavities. Illustrative of the pathology of the disease and the real origin of the apoplectic congestion, the following remarks of Dr. Watson are quite appropriate: —

"In truth, the morbid condition of the lungs which I am now speaking of, has been badly named. The application, by Laennec, of the term *apoplexy* to the *lungs* was singularly unfortunate; for it suggests an analogy between two things, which, though resembling each other in the appearances which they leave behind them in the organ affected, are yet, essentially, unlike. I have shown you, in a previous part of the course, that cerebral hemorrhage depends almost always upon the giving way of a bloodvessel, in consequence of the morbid brittleness of its coats; while what is called pulmonary apoplexy can very seldom indeed be so caused. The notions which I have been led to form upon this subject differ materially from those which you will find expressed in the works of almost every writer on pulmonary apoplexy. The opinions I enter-

tain were stated several years ago, in some lectures which I was appointed to deliver before the College of Physicians; and I have constantly been in the habit of mentioning them to the pupils of the Middlesex Hospital, and to my medical friends. It is a matter of satisfaction to me to find that they are esteemed to be correct by so sound a pathologist as Dr. Carswell, who has alluded to them in one of his fasciculi on the *Elementary Forms of Disease.* Laennec speaks of the pulmonary apoplexy, as if *it* were the *cause* of the hemoptysis. But this is surely a very incorrect view of the matter. The partial engorgement, and the hemoptysis, are not mutually connected with each other as cause and effect, but they are *concurrent* effects of the *same* cause; of that cause which gives rise to the extravasation or exhalation of the blood in the first instance. A part of the blood so extravasated passes outwards by the trachea and mouth; while a part is forced in the contrary direction, into the ultimate divisions of the bronchi, so as to fill and block up the whole tissue of a single lobule, or of a bunch of contiguous lobules, and thus arises the *circumscribed* variety. Andral conceives that the sanguine effusion *takes place* in the ultimate air-cells; and *he* applies to this form of disease the term *pneumo-hemorrhage*, to distinguish it from ordinary hemoptysis, which he calls *broncho*-hemorrhage; and this I believe to be the true pathology of the *uncircumscribed* variety. But it seems to be vastly more probable that, in the other form of the complaint, the seat of the effusion is in one or more of the larger branches of the air-tubes; and that the blood, a part of it at least, is driven backwards into certain of the pulmonary lobules, by the convulsive efforts to respire which the patient makes when threatened with suffocation by the copious expulsion of blood, or by a paroxysm of cough and extreme dyspnœa: especially if the blood is poured out from the membrane while the chest is in the state of *ex*piration. It is easy to understand how certain portions of the lungs, without undergoing any actual change of texture, may in this manner be so choked up and crammed with blood, which afterwards coagulates, as to preclude any subsequent admission of *air*." (*Lect. on the Princip. and Pract. of Physic.*)

"The principal *symptom* attending the formation of these masses is *hemoptysis*; and the principal, though not the only *cause*, is disease of the heart. The hemorrhage is often severe and copious in the first, or circumscribed form: sometimes slight and scanty, but commonly slow, oozing, and persistent, in the second or uncircumscribed form. The heart disease is in its left chambers, and very often consists in contraction of the mitral orifice. No example of pulmonary apoplexy, or of pulmonary hemorrhage, even *apparently* dependent upon hypertrophy of the *right* side of the heart, has ever fallen under my notice."

Among the curiosities of this disease may be mentioned its originating sometimes from strong sensations; such as the impression of music, above all, on phthisical patients. M. Andral, from whom I freely borrow, just now, relates the case of a young man

who spit blood whenever leeches were applied to his chest. Sometimes this discharge has come on in consequence of the application of a sinapism or a blister; means these, in other cases, of arresting the disease. Frank tells us of a person who could not sleep during the day without a spitting of blood resulting; and that he saw another who was seized with hemoptysis whenever he ate honey, and another again after having eaten asparagus. In very nervous subjects the disease has been brought on by strong odours.

In the *symptoms* of bronchial hemorrhage, we note considerable variety. These have been met with in persons who have been attacked, without any precursory or even associated symptoms, and who enjoyed good health afterwards, as they had before. Very generally, however, the disease is ushered in by numerous and marked symptoms. Among these I may mention a feeling of heat and weight, and an inexpressible uneasiness in the chest, or in some part of that cavity; a saltish taste, or that of blood, in the mouth. Soon afterwards the extremities, and sometimes the whole surface of the body is cold, and irregular chills are experienced in the back and loins; the countenance is changed, the face becoming alternately pale and flushed: there is a singing in the ears, lustre and injection of the eyes, headache, and palpitation. The pulse is accelerated, full, hard, and vibrating: pain and uneasiness in the limbs are complained of. The laborious breathing is augmented, and the patient feels a kind of bubbling caused by the passage of air during the movements of inspiration and expiration, and at the bifurcation of the bronchia a sensation of tickling and pricking. Now comes on expectoration, consisting of mucus streaked with blood, or of pure blood, or this fluid is ejected by mouthfuls. It is florid and frothy, unless it has been retained for a time in the bronchial cells, in which case it is dark, and towards the end of the attack clotted.

Sometimes the quantity and rapidity of the discharge is such that one would describe it as a vomiting of blood. After it has ceased the patient commonly experiences relief, especially from the oppression, palpitations, and headache. This absence of disease may be either temporary or permanent. Often, at the expiration of a certain not well-defined period, the same symptoms of congestion, already enumerated, are manifested, and are followed by fresh hemorrhage. In some cases this kind of paroxysm has returned five or six times in the course of the day; its intensity diminishing, however, at each repetition. The quantity of blood discharged is very variable: some persons only giving out a few drops, others many ounces, and even some pounds, in the twenty-four hours.

There are hardly any physical signs of bronchial hemorrhage: nothing peculiar is indicated by percussion; the chest being perfectly sonorous, and auscultation only shows a mucous rattle or rhonchus with unequal bubbles, usually larger than those of catarrh, and formed, one may suppose, of more liquid materials. The rattle is more or less evident according to the quantity of blood effused.

These remarks apply to simple bronchial hemorrhage; but when it is associated with and kept up by that congested and indurated state of a portion of the lung called *pulmonary apoplexy*, auscultation makes us acquainted with the differential diagnosis. In this case the stethoscope, according to Laennec, furnishes us with two principal signs, viz., 1, the absence of the sound of respiration over a small, circumscribed space; and, 2, the crepitous rhonchus around this space. This rhonchus, which here indicates the slight infiltration of blood, already described, is always found at the commencement of the disease, but is frequently wanting in its latter stages. When these signs, and the fact is of great importance, coexist with pulmonary hemorrhage, we may be assured that the origin of the discharge is in the pulmonary substance, and not in the bronchia simply. If the induration of pulmonary tissue is excessive, the absence of sound, or at least of sonorousness on percussion joined with the signs already indicated, leaves no doubt of the nature of the disease, and prevents its being confounded with any other except peripneumony; and even then only in cases in which the spitting of blood is not very considerable.

In the spitting of blood which accompanies tubercles of the lungs, we can determine the nature of the cause or combination by the physical signs characteristic of the tuberculous affection, to be hereafter described. Commonly the hemorrhage in this case is bronchial or simple; whilst that connected with pulmonary apoplexy depends more on hypertrophy and other affections of the heart, and particularly of its right side.

The *progress* of hemoptysis is not by any means uniform. It has been already stated that, in some cases, the attack takes place but once, and with its cessation the person is left in good health. There are individuals, and particularly of the female sex, who spit a little blood every day for months and even years. In some it is readily reproduced by the same causes which brought it on at first; in others it comes on without obvious cause. Appearing for the most part at irregular intervals, bronchial hemorrhage is sometimes periodical: in some women it supplies regularly every month the menses. Moseley and other writers relate cases in which it has corresponded very accurately with lunar epochs, in the male sex. After the cessation of the active discharge there is cough, and the mucus expectorated is usually mixed for some days with dark or clotted blood, which daily diminishes in quantity.

The *diagnosis* is not always easy, particularly between pneumonia and hemoptysis, if the latter be dependent on pulmonary apoplexy. In pneumonia the sputa are distinct, and, as it were, fused, which is not the case in the other disease. In nasal hemorrhage the blood sometimes passes into the posterior nares, and thence into the fauces; and is brought up by hawking, sometimes accompanied by cough, but the fluid is dark, and not frothy, like that which comes from the bronchia. In some cases, again, there is a

slight hemorrhage from the vessels of the pharynx, which, calling the bronchia into sympathetic irritation, may be associated with cough, and mixed with the expectorated matter thus brought up, and impose on the physician as a true hemoptysis. This latter is usually represented as readily distinguishable from hematemesis, by the cough, dyspnœa, vermilion colour of the blood, and its mixture with bubbles of air, when the discharge is from the bronchia; while in hemorrhage from the stomach there is nausea, oppression at the epigastrium, mixture of the blood with aliment, and with bile and mucosities. It may happen, however, that the patient is seized with vomiting at the same time there is bronchial hemorrhage, and then we may expect to see alimentary matter mixed with the blood; nor is the colour of this fluid always so contrasted in the two diseases as is generally represented by systematic writers. Costiveness and tardy digestion may accompany both hemoptysis and hematemesis; but these symptoms are most common in the latter. The pulse is generally fuller and harder in the bronchial than in the gastric hemorrhage. The expectorated blood sometimes comes from the rupture of an aneurism of the aorta, in which case there is little time allowed for nicety of diagnosis or recourse to remedies, as the case at once terminates fatally.

Our *prognosis* in bronchial hemorrhage or hemoptysis will be inferred from what has been said in preceding parts of this lecture on the varieties and progress of the disease. M. Andral assures us, that he has ascertained, by autopsic examinations, that more than a fifth of the cases of hemoptysis are not tuberculous, that is, are not dependent on or associated with pulmonary tubercles. In addition to the remarks already made on this point, I may add, that we see individuals in advanced age who in their youth had spitting of blood; some of them valetudinarians, others in robust health. Still, must we not forget the important and melancholy fact, that in a large majority of cases of bronchial hemorrhage this is preceded or followed by pulmonary consumption.

The *organic changes of structure* produced by, or rather associated with, and following simple hemoptysis, are not numerous nor well marked. Blood, more or less fluid, has been found in the bronchia; and when coagula are present, they exhibit, at times, fibrinous concretions in the form of polypi. The mucous membrane is commonly a little softened and tinged with blood in its entire substance: but in general its alterations are not different from those met with in simple bronchitis. Sometimes, even, it is pale, or at most presents a light rosy tint. A similar state of other mucous membranes which were the seat of hemorrhages has been observed; as those from the intestines, which have been found pale, with slight injection in some points. We may, as M. Andral suggests, attribute this want of colour of the mucous membranes, after death from hemorrhage, to the circumstance of the blood having escaped from the vessels in place of remaining in them, and giving rise to the appearance of congestion and inflammation. But in

hemoptysis dependent on pulmonary apoplexy or pulmonary hemorrhage; that is to say, when bronchial hemorrhage has succeeded to hemorrhagic effusion into the pulmonary tissue, the organic changes are more evident. Portions, not indeed large, of the substance of the lungs, are found indurated to an extent of the greatest degree of hepatization. The extent of lesion is both small and circumscribed; the pulmonary tissue around being quite sound and crepitous, and has none of that appearance of progressive induration which we find in pneumonia. The indurated portion is of a very dark red, exactly like that of a clot of venous blood, and quite homogeneous; disclosing nothing of the natural texture of the part, except the bronchial tubes and the larger bloodvessels. In hepatized lung after pneumonia, on the other hand, we can perceive, says Laennec, who draws the contrasted picture which I am now copying, the dark pulmonary spots, the bloodvessels, and the fine cellular intersections; all of which give to this morbid state the aspect of certain kinds of granite. M. Andral's description of the appearance of indurated portions of the lungs in hemoptysis with pulmonary apoplexy is nearly similar to that of Laennec's, as will be seen by reference to his *Clinique Medicale*. The tissue of the lung at the indurated portions, says this writer, was very hard, black, and granular, when cut into; and there issued out from them a liquid similar to coagulated venous blood by strong pressure. Around this altered tissue the lung was pale, crepitous, and engorged with serosity. The description of the mode of this formation, by Dr. Watson, has been given in the beginning of this lecture.

The TREATMENT of bronchial hemorrhage resolves itself into, 1, the means of arresting the discharge; and, 2, those of preventing its return. It consists in diminishing the sanguineous congestion in the lungs, and in relieving the oppression of these organs, and consequently the turgescence of the bronchial mucous membrane, by revulsive action of other organs and tissues. Venesection and sedatives are employed to meet the first indication; and purging, sometimes vomiting, tonics, and external counter-irritants, to meet the second.

Of the remedial effects of bloodletting, M. Andral is disposed to think more highly than even our own heroic school at home. Those of the latter, who derive their notions of French practice from a perusal of some of the older writers and chance passages in English books, will be surprised to learn that the author just named expresses himself in the following manner, on this subject, in his *Cours de Pathologie:* We have recourse to emissions of blood either to ward off an attack of this disease, or to arrest it, or to prevent its recurrence. When a patient, continues M. Andral, exhibits all the symptoms which characterise the imminence of hemoptysis, as when he is oppressed and pale, and has rigors through his frame, bleed him at this time, and you will prevent the hemorrhage. Bleed, also, when the hemorrhage is present, and bleed largely if you wish to obtain satisfactory results. If you use leeches, take

especial care that they be not applied to the chest, but to the anus, especially when you have to deal with nervous subjects, or with women.

As a general rule we should draw blood at once from a vein, in an attack of hemoptysis, and in such quantity as to produce a marked impression on the system, which is measured, not only by a reduction of the pulse, but by a removal of the oppression, heat, and stricture of the chest, and a feeling of relaxation bordering on syncope. But in doing this we must not act empirically, and without an understanding of our true position, determined by a knowledge of the premises. In incipient hemoptysis, and in the first attack, we should bleed more freely than after the hemorrhage has been considerable, or in a case in which it has been of repeated recurrence. We ought, also, to be aware, that a simple idiopathic bronchial hemorrhage will sometimes be of itself sufficient to relieve the congestion, which may have been but temporary, of the mucous membrane; and that if the discharge do not cease spontaneously, it is readily stopped by means of an easy application to be hereafter mentioned. When, on the other hand, we are led to believe, from the habit and general appearance of the patient, and from the physical signs, particularly those furnished by auscultation formerly detailed, as well as by the excessive oppression, and sometimes even acute pain of the chest, that the bronchial is associated with pulmonary hemorrhage or apoplexy, then should we not lose a moment's time in having recourse to the lancet, and in procuring a large abstraction of blood. One bloodletting, says Laennec, of twenty to twenty-four ounces on the first or second day, will have more effect in checking the hemorrhage, than several pounds taken away in the course of a fortnight. It is even beneficial, in general, continues this able practitioner and writer, to induce partial syncope by means of the first bleeding. In cases of this kind, the fear of exhausting the patient's strength is without foundation, since we know that the most copious venesection falls short of the loss of blood sustained from pulmonary hemorrhage, in young and robust subjects, even in the course of a few minutes; *while the debilitating effect of the hemorrhage is infinitely greater than the loss of blood produced by the lancet* (Forbes' Translation). This advice does not assuredly look like tampering with the disease, by trusting its cure to the expectant method, which some persons still believe to be synonymous with French medicine.

Simultaneously with recourse to bloodletting should be the employment of other auxiliary but not unimportant measures. The position of the patient must be semi-erect, or sitting, if the strength will allow of it; or, at any rate, he should be propped up in bed so as to have the chest and shoulders raised; nor must these parts be enveloped in warm bedding and clothing; but on the contrary they ought to be exposed to a cool air, and even the chest sponged with cold water and vinegar. The remedies at this time, taken inter-

nally, may be of a simple and readily obtainable kind; such as vinegar, or common table salt, or mouthfuls of cold and even ice water. The theory of the effects of this refrigerating or sedative practice, is, that the diminished excitement produced on the capillaries and exhalents of the skin, and the gastric mucous membrane, is participated in by those of the bronchial mucous, which, in consequence, refuse to give passage to the blood brought by the larger vessels. But, in advising these remedies, and I think the remark may be extended to the acetate of lead, erroneously called an astringent in place of a sedative, we must be prepared to see after their use a reaction of the capillary tissue, and a renewal of the discharge, if it have depended on pulmonary congestion, strengthened by general plethora, and perhaps hypertrophy of one of the great cavities of the heart. The occurrence of reaction is not so much an argument, however, against these sedative or refrigerant agents as adjuvants to bloodletting, as against reliance on their sole use, unless in simple bronchial hemorrhage. The inference which I wish to draw from these remarks is, that the indication to be fulfilled, not only in hemoptysis, but in other hemorrhages, is to remove the cause; as it may be supposed to depend either on increased molimen, or undue determination to the lungs, and congestion of the bronchial mucous membrane. Even if we were possessed of certain means for curing a lesion of the vessels which exhale and secrete blood, their early employment would be of doubtful efficacy at best, and most probably decidedly injurious. This is a question which ought to be presented, from the beginning, to the mind of the physician who has taken charge of a case of hemoptysis, and who may be debating with himself, or with a medical friend, the propriety of trying substitutes for venesection, in order to arrest the hemorrhage. The quantity of blood, and the exaltation of vital phenomena consequent on or associated with its greater afflux at this time to the lungs, must be diminished. The means are depletion and derivation. Venesection in the arm or in the foot carries out both of these objects, but more particularly depletion, and unloading of the vascular system. After this, derivation is easier; and when the hemorrhage originates in the suppression of some other discharge, it is necessary. Thus, if habitual hemorrhoids have disappeared, or the menses have been wanting beyond the customary epoch, leeches to the anus, and a brisk purge of calomel and aloes, or, for more prompt effect, a stimulating enema, as of oil of turpentine even, are called for. Without giving it the importance which I once did, and which perhaps some of my professional brethren are still inclined to do, I cannot but think that the removal of hepatic congestion and of obstruction in the portal circle by active purging, as a revulsive measure, will contribute to relieve the oppression of the lungs in hemoptysis. Nor can we overlook the direct sympathy noticed before between the bronchial and gastro-intestinal mucous membranes, and the

benefit received in phlegmasia and congestions of the former by a pouring out of fluids from the latter.

In speaking, as I have just done, of the application of leeches, and of the employment of purgatives, as both of them answering the indication for derivatives, I do not mean to affirm that they are either identical or equally beneficial in their operation. Purgatives follow properly and safely in subjects of both sexes after bloodletting; leeches chiefly, if not only, under the circumstances stated, viz., of suppressed hemorrhoids or menses. Obviously proper as this last would seem to be from analogy, and a knowledge of their generally beneficial derivative action, they are not always safe or useful in hemoptysis, certainly not as a substitute for venesection in the first attack and early periods of the disease. Laennec has noticed the return of the menses and aggravation of menorrhagia during the application of leeches to the epigastrium. The first of these effects I have myself seen from this cause. But still farther, general bleedings, and more particularly those of small extent, have appeared, under the observation of the French writer just quoted, to have a like effect on hemoptysis; and cases of this kind are clearly those in which purgatives should have a trial. On this remark, Doctor, now Sir James Clark, has the following comment: — "The fact is not generally known, though it is one of great practical importance. In a plethoric person threatened with apoplexy of the brain or hemoptysis, the application of leeches may, and, I believe, frequently does, decide the very occurrence of the disease it was intended to prevent. I have more than once seen slight hemoptysis follow the application of leeches round the anus, (and have warned patients not to be alarmed at it,) when applied to obviate pulmonary hemorrhage. In one case a severe attack of hemoptysis took place a few hours after the application of the leeches, requiring general bloodletting, &c. A very small bleeding may, as Laennec observes, produce the same effect; but independently of the quantity of blood abstracted, there is a sympathetic effect produced on the extreme vessels by the action of the leeches, or the consequent flow of blood from their punctures, which is very desirable and useful when we wish to promote a sanguine secretion, as the menses; but may be injurious when we wish to obviate an effusion of blood from the extreme vessels: a general bleeding is by far the better practice in the cases under consideration."

Upon the whole, then, the safer practice is, after venesection, to purge; and in so doing selection should be made of those articles which procure abundant evacuations without straining, the bad effects of which in congestion or retarded circulation of the lungs can be readily imagined. I have myself found, that common mercurial purgatives, such as calomel and jalap, calomel followed by the compound powder of jalap, or by rhubarb and magnesia, are preferable to the simple saline; although theory would indicate the superiority of these latter on the ground of the more copious fluid

discharges and consequent diminution of the bulk of the contained blood of the vascular system following their operation.

Hemoptysis with febrile reaction may at once be treated, after venesection, or where the hemorrhage is but slight and its returns have been frequent, without this preliminary, by sugar of lead, *sub-acetas plumbi*. This medicine has acquired great and in many cases deserved reputation in nearly all the forms of hemorrhage, particularly when administered in conjunction with opium, as in the following formulæ: —

℞. Plumb. sub-acetat., gr. xii.
Pulv. opii, gr. i.
Sacch. albi, ʒss.
M. ft. pulv. vi.

Take one every two hours, or until the hemorrhage is arrested. In cases of general plethora and capillary excitement, the opium is not a fit addition; but, on the other hand, where the excitement is unequal and the plethora local, this medicine contributes very much to equalize the circulation; and, by causing a certain degree of fulness of the capillary circulation in all the organs, to take off the strain upon those of the lungs. Care ought to be used that a simple, and in milder cases a sufficient remedy, in hemoptysis, diluted mineral acid, and especially the sulphuric, be not administered at the time in which you are prescribing the sugar of lead. But, on the other hand, it may be prudent, and will rather aid the refrigerant effects of the salt of lead, to follow the advice of Dr. Thomson, by directing your patient to drink dilute acetic acid, in order to prevent any possibility of the conversion of the acetate into the carbonate, in which last form alone it is specifically injurious to the animal economy.

My own experience enables me to speak with considerable confidence of the powers of the potassio-tartrate of antimony, or tartar emetic, in restraining and arresting pulmonary hemorrhage, and that in the most safe manner, viz., by diminishing the morbid action of the heart, abating the inflammatory congestion, as well as producing a sedative impression on the bleeding capillaries themselves. But whether you choose to adopt my explanation or not, you may be assured of the fact. I give the tartar emetic in simple watery solution, in the dose of an eighth to a fourth of a grain, every hour or two, according to the urgency of the case and the toleration of the medicine by the stomach, without vomiting being brought on. Even if nausea and retching should ensue, the state of arterial sedation which precedes will prevent any injurious effect, or any increase of hemorrhage, which, without such prior depression, would be readily brought on by this means. In the weeping hemoptysis, or oozing of blood, not much in quantity at a time, but persisting with, at the same time, febrile reaction, yet not enough to justify venesection, I have prescribed the tartar emetic with the best effect. So obvious, indeed, and at the same time so mild is it in its effects, that my patients have at different

times asked for a renewal of it, when its use had been temporarily suspended.

When hemoptysis assumes a chronic character, and we have symptoms of bronchial congestion, with small but frequent discharges of blood, and associated disorder of digestion, you will find the blue mass, in doses of three to five grains, and a grain of ipecacuanha once or twice a day, and rhubarb and magnesia, or a small dose of salts on the following day, if necessary to procure a full alvine discharge, a good plan of treatment; to be continued until the tongue is clean and the bleeding arrested, or reduced to a very small quantity at prolonged periods. Sometimes a pill, composed of ipecacuanha and soap, taken two or three times a day, for some days, will suffice under these circumstances. If anæmia be present, or the patient much reduced by the hemorrhage, and the vascular excitement be inconsiderable, small doses of the oil of turpentine, as ten to twenty drops in some mucilage three times a day, are found to restrain and check the discharge. It is in cases of this nature, and in scrofulous habits, that the hemorrhage has been called passive, and in which vegetable astringents have been prescribed. Of these pure tannin, galls, or rhatany in moderate doses, will be chosen. In cases of incipient tubercle, the administration of narcotics and some preparation of iron should be tried, under the hope of postponing for a time, at any rate, the development of the symptoms of phthisis. With this view, also, even more than merely to prevent the recurrence of hemorrhage, a permanent discharge from the inside of the arm by a blister, or from the chest by means of tartar emetic, may be kept up with good effect.

All the customary means of giving tone to the general system, without any special strain upon the lungs, should be had recourse to. Of these the chief are, plain nutriment, moderate exercise, especially on horseback, and alternately with that on foot; the tepid and after a while, if the reaction be sufficient, the cold bath, by momentary immersion or by shower; frictions, and great attention to preserving the feet warm and dry. Late hours and nocturnal excess of any kind are to be avoided by the invalid, who is fearful of a return of hemoptysis.

LECTURE LXVII.

DR. BELL.

PNEUMONIA.—The transition slight from bronchitis to pneumonia—Peculiarity of seat of pneumonia—Definition—*Stages*—*Symptoms*,—local and general,—The three chief diagnostic ones,—Cough, expectoration, characters of the sputa, dyspnœa, pain, decubitus—Percussion—Auscultation—Crepitation—Appearance of inflamed lung—The several stages of inflammation—*General symptoms*,—disordered circulation and pungent heat of the skin the most common—*Precursory symptoms and complications*—Pneumonia succeeding bronchitis and other diseases—*Typhoid pneumonia*—Dr. Williamsis and Dr. Stokes's descriptions—*Progress*—Collapse—*Duration.*—*Disease.*

PNEUMONIA.—PERIPNEUMONY.—PNEUMONITIS. — PULMONITIS. — The passage from the bronchial tubes, and more especially their vesical

terminations, to the adjoining tissue external to them, or the pulmonary parenchyma, is indeed slight; and, as Dr. Stokes aptly remarks, he who would call pneumonia a bronchitis of the terminal tubes would be hardly guilty of a misnomer. Using also the language of Dr. Williams on this point, we may ask: But what is this parenchyma, if you take from it the membrane that lines the air-tubes and cells, and the pleura which covers their exterior? See how delicate is the structure of this piece of healthy lung? how thin are the fibres that separate these minute membranous bubbles—this tissue of froth! How can we distinguish the parenchyma from the investing membrane? We can scarcely do so by anatomy. But physiology and pathology come to our aid, and supply us with a test that enables us to make good the division, long established in practice, of diseases of the lungs, into those of the investing membranes and those of the parenchyma. Let us recollect the great purpose of the function of the lungs, and we shall bring to mind the air and the blood that exert across the membranes a mutual influence on each other. We have spoken of the vessels which contain the air, but not of those which contain the blood: these are they that lie between the aërial and pleural tissues of the lung, and with connecting cellular tissue, spread in exceedingly delicate fashion between the cells, but thicker round the tubes and between the lobules; these constitute the proper parenchyma of the lung.

In the following lectures on pneumonia, with the works of Laennec and Andral before me, I shall most likely be found to make freer use of the admirable compend on this disease by the latter writer, in his *Pathologie Interne*, at the same time that I borrow freely from Drs. Stokes and Williams, two of the ablest British commentators and imitators of these illustrious Frenchmen.

Pneumonia was declared by Broussais to consist in an inflammation of the pulmonary vesicles, and of the cellular tissue interposed between these vesicles. This is the view adopted by MM. Andral and Bouillaud. A more comprehensive definition is given by Dr. Williams (*Cyclopedia of Practical Medicine*); viz., *Fever, with more or less pain in some part of the chest; accelerated and somewhat oppressed breathing, cough with viscid and rusty-coloured expectoration; at first the crepitant rhonchus, afterwards bronchial respiration and bronchophony, with dulness of sound on percussion in some part of the thorax.* He adds: pathologically, pneumonia consists essentially in an inflammation of the parenchyma of the lung, occasionally but not necessarily extending to the pleura investing them; which inflammation, though it usually occasions a certain combination of general symptoms, is not so essentially connected with these symptoms as to receive from them an infallibly pathognomonic character.

Stages. — Before speaking of the symptoms of pneumonia, let us carry along in our minds the several stages of the disease, which are enumerated as follows by Dr. Stokes (*op. cit.*):—1st. The lung

drier than natural, with intense arterial injection. No effusion of blood into the cells. 2. (Laennec's first.) The cells gorged with blood. No change of structure. 3. (Laennec's second.) Solidity and softening (the red softening of Andral). 4. Interstitial suppuration. 5. Abscess.

The *symptoms* are local or general: those furnished by the lungs; those by the other organs or organic systems sympathetically and secondarily disordered with them. Under the first head we include cough, expectoration, pain, dyspnœa, decubitus, and the signs furnished by percussion and auscultation. Before speaking of these in succession, I may as well at once tell you of the three chief diagnostic marks of pneumonia. They are: 1st, the crepitating sound transmitted when the ear is applied to the chest, or rather to that part in which is contained the diseased lung; 2, the rust colour of the sputa; 3, the peculiar pungent heat of the skin.

Local Symptoms. — Cough is present in a very large majority of cases of pneumonia; but it exhibits no peculiarity, nor are its violence and frequency proportionate to the violence of the disease. The expectoration in the beginning of pneumonia is commonly null, or analogous to that in acute bronchitis. From the second to the third day it assumes its characteristic appearance: the sputa become sanguinolent, owing to the intimate mixture of blood with mucus. Their colour varies with the quantity of blood which they contain; and hence, they may be yellow, rusty, or of a decided red; and they may even pass through all these shades in the same day. Their density augments as the disease advances; they become viscous, tenacious, transparent, and strongly adherent to each other. So decided, at times, is their gelatiniform consistence, that the vessel containing the sputa may be completely inverted without their being detached from it. This last change is seen when the inflammation passes to the second stage, for so long as it remains in the first, the sputa have not tenacity enough to adhere to the sides of the vessel.

A termination of the disease in resolution is indicated by a less heightened colour and viscidity of the sputa; but if, after becoming thinner, they are again tenacious, they indicate that the pneumonia is paroxysmal. Sometimes, even although the sputa have lost all their pneumonitic characters, and exhibit those of the catarrhal state, yet auscultation still apprises us of a crepitation or crepitating rhonchus (*râle*) of more or less duration.

A suppression of the expectoration may occur from an exasperation of the disease; and also from an excessive viscosity of the sputa, or from the weakness of the patient; and in these cases the secreted matter may accumulate in the trachea, and cause death by asphyxia; or this result may be brought about by a suppression of the secretion itself.

The expectoration may be also suspended by other diseases complicated with pneumonia, by purgatives given early in the disease, by excessive bloodletting or its unseasonable repetition; and by all

the causes which aggravate pulmonary inflammation. In some cases of fatal pneumonia the sputa are not suppressed; but they are smaller in quantity, become changed in their appearance, and are opaque and mottled with dirty, reddish-grey streaks, resembling those seen in the last stage of consumption.

When pneumonia terminates by suppuration, the sputa are grayish, inodorous, and in a measure purulent: even in the red hepatisation or friability they may preserve the same characters; and, finally, they may lose their viscosity, and resemble a liquid of the consistence of gum-water, and of the colour of liquorice or prune decoction. The termination in gangrene is manifested by the expectoration of a greenish matter, which yields after a while a dirty-gray, and exhales an insupportably fetid and characteristic odour. When pneumonia passes into a chronic state, the sputa are like those of pulmonary catarrh. All cases of pneumonia are not characterised by distinct expectoration: some of them slight, some grave, running their course to a happy or fatal termination; and yet the sputa merely resemble those of a simple bronchitis. In intercurrent pneumonia particularly, it is common to see the absence of expectoration.

The colour of the sputa is attributed generally to the blood, in varying quantity, mixed with them. They are rarely tinged by bile.

The dyspnœa is generally in proportion to the extent and seat of the inflammation; although in this respect there are great differences among different individuals. When the breathing is hurried and laborious, and the feeling of oppression so great that the patient sits up in his bed, complains of a weight in his chest, has the face of a violet-red, or of a livid hue, and pants to such a degree that speech is extremely difficult, if not impossible,— we must augur an unfavourable termination. Dyspnœa may, it is true, remain after the danger is over; and in such a case it is owing either to the imperfect resolution of the disease, or to the weakness of the patient.

Pain, according to Andral, is never felt in pneumonia, unless there be pleuritis coexisting; but Laennec asserts that simple inflammation of the lung has given rise to pain; a fact which he had an opportunity of ascertaining by dissection of the patient after death. Commonly, the pain is felt behind the mamma, or a little below or just above and between it and the clavicle; or in one or other of the hypochondria. It is increased by coughing, change of posture, pressure on percussion.

As to the decubitus, it is not correct that the sick always lie on the affected side: the posture is generally that on the back.

Percussion does not show any change in the sonorousness of the chest, in the first stage of pneumonia; and it is rarely until the second or third day that a dull sound is evident. As the disease disappears the natural sound of the chest is restored. Percussion cannot be practised when the walls of the thorax are painful, or covered with a vesicated surface, or there is deformity of the chest. In

practising percussion, do not forget that the liver on the right side, and the spleen on the left, will cause a dull sound on percussion of the lower part of the thorax.

Auscultation, either by applying the ear to the chest, or by the intervention of a stethoscope, enables us to reach generally an accurate diagnosis of pneumonia. The sound heard at this time, if the diseased part be that chosen to which to apply the ear, yields the *crepitating rhonchus* of Laennec, or the *fine crepitation*, as some others term it, resembling the sound made by projecting small portions of salt on live coals, or by rumpling a fine piece of parchment. Another comparison of the kind of sound of crepitation was made, when speaking, in a recent lecture, of the sound sent forth during respiration by diseased lungs. This kind of crepitation does not, however, entirely replace the respiratory murmur of health, which is more or less marked on the occasion; but in proportion to the intensity of the inflammation is the intensity of the crepitation, which, after a time, entirely conceals the respiratory murmur. By some observers (Drs. Gerhard and Rufz), this crepitation is said to be wanting in children between ten and five years old suffering from pneumonia: by others (MM. Rilliet and Barthez), it has been distinctly heard. With the exception of three cases, it has always been blended with bronchial respiration, in the experience of these last mentioned writers.

By M. Andral the cause of the crepitation was attributed to the passage of air in small bubbles through serum effused in minute air-tubes and vesicles; and he supposed that the fine and even character of the crepitation depended on the smallness of the bubbles in the extremest tubes. Dr. Williams, on the other hand, regards this crepitation as distinct in its nature from the other rhonchi. He points out the fact of the narrowness and partial obstruction of the extreme air-tubes and cells in the first stage of peripneumony, by the enlarged vessels distributed between and around them. Now, as the smallest tubes are narrower than the cells in which they terminate, may not, as Dr. W. asks, obstruction become such in them that the air can force itself through the viscid mucus which lines them, only in successive minute bubbles, the crackling of which constitutes the crepitation in question.

The crepitating rhonchus, or the minute crepitation, is characteristic of the first degree of pneumonia, or that of turgescence and engorgement, — the second of Dr. Stokes, who believes intense respiratory murmur in the affected part and fever to be indicative of the (his) first stage, and precursor of crepitation. In the first stage the pulmonary vessels are so much distended that the whole tissue is of different shades of red. In some cases, a frothy serum exudes when the lung is cut; this is probably the effusion of blood after death, for it is not observed in those cases in which the blood remains in a fluid state. Andral examined an inflamed lung, after drying and slicing it; and the only difference which he could perceive in the structure, was that the coats of the cells were some-

what thicker and redder than natural; but there was not that obliteration of the cells that might have been expected if they had been filled with blood. This last may cease to be heard under two different circumstances; in the first, crepitation yields to the respiratory murmur, and the disease ends in resolution; in the second, it advances from bad to worse, and then no sound is heard, or else crepitation is replaced by another sound; the phenomena are increased, and the lung becomes hepatised. This change is the result of deposition of lymph in its cellular interstices, and the retention of blood or engorgement in its minute capillaries. Hepatised lung is denser and more solid than before; but it is also more friable; more easily crushed and broken. If we take a portion of hepatised lung, and examine the torn surface with a magnifying glass, the pulmonary tissue will appear to be composed of a crowd of small, red granulations, lying close to each other. These are, we may presume, the air-vesicles clogged up, thickened, and made red by the inflammation. The colour of hepatised lung will vary much, according to the quantity of blood left in it; if this be much, it will be red; if little, pinkish-brown, or reddish-gray; if mixed, the black pulmonary matter. Lung thus diseased does not collapse when the thorax is laid open: the marks of the ribs are frequently visible on the surface. The texture of the lung at this time is sometimes so soft that a moderate degree of pressure between the fingers reduces it to a state of pulp. Sometimes the state of organic change just described is confined to certain of the pulmonary lobes, and then it is called *lobular* pneumonia.

The deposition of lymph which constitutes hepatization of the lung completes the obstruction of the minute tubes and cells: hence all crepitation ceases, and the only sounds that reach the ear are those of the air and voice in the larger tubes. Instead of the respiration with its prolonged murmur, there is only a *short whiffing*, as Dr. Williams expresses it, confined to parts only of the respiratory act, and often ending abruptly with a *click*. This bronchial whiffing is not heard in every case, but only when the hepatisation involves considerable bronchial tubes; and it is most commonly found in the middle portions of the chest. M. Andral designates the sound given out at this time, on applying the ear to the chest, by the term *tubular respiration*, owing to its resemblance to the sound which would be produced by blowing into a tube close to the ear of the listener. It is a variety of bronchial respiration. The voice is modified at the same time in a peculiar manner, in its passage through the lungs and parietes of the chest, in reaching the ear of the physician applied to the latter. The vocal resonance of the tubes is also transmitted by the condensed lungs to the parietes, as a vibration or *fremitus*, which may be distinctly felt by the hand placed on the affected side, and which is much stronger than that on the healthy one. This affords an easy mode of distinguishing between a hepatised lung and a pleuritic effusion; for the latter when considerable generally abolishes completely the vocal vibration.

Often we hear in the same patient and at the same time different signs furnished by auscultation, which announce different stages of pneumonia. On the healthy side we hear, by auscultation, the normal respiration, of much more intensity than in health. Sometimes auscultation supplies us with negative results. This happens when the fluid accumulated in the bronchia is in quantity enough to cause so strong a bronchial rhonchus as to cover all the other sounds. If the inflammation be very limited, and only occupy a part of the base, centre, or root of the lungs, auscultation, M. Andral thinks, gives no indication to guide us. Auscultation traces the morbid changes in the lung through the stages of engorgement to hepatization. "Can it," says Dr. Watson, "trace it any further? I believe not, with any certainty." But, at last, he adds, — the structure of the lung breaks down, and a portion of it is expectorated, and finds its way into the vacant spot, and gives rise to large *guggling* crepitation. Among the local symptoms should be noticed a diminution in the motion of the affected side, in proportion as the air fails to get admittance into the inflamed lung.

The third stage of Laennec, to which inflammation brings the lungs, is that of *suppuration* or *yellow* hepatization. This consists in the conversion of the semi-solid particles of lymph or blood, which constitutes the solid or red hepatization, into an opaque, light-yellowish, friable matter, and finally into a fluid pus. This suppuration is generally diffused in the form of purulent infiltration; but it is very rare to find it assume the character of a distinct abscess. This last is an uncommon termination of pneumonia. In several hundred dissections of persons dead of this disease, made by Laennec during a space of more than twenty years, he only met with five or six collections of pus in the inflamed lung. Once only did he find a *large* abscess of that sort. Andral has only once seen a real abscess of the lung form as a consequence of pneumonia. Phlebitic deposits of pus and sometimes tubercular vomicæ and cavities, may have been taken for genuine abscesses of the lung.

Gangrene is an unusual result of pulmonary inflammation; being nearly as uncommon as the formation of an abscess. It seems, however, as remarked by Dr. Williams, to arise pretty generally from the influence of those noxious gases which directly destroy the vitality of the tissue of the lung. The lungs of persons who have died some days after being nearly asphyxiated in sewers, have been found reduced, in parts, to a dark brown, greenish, or livid softening, having a very fetid odour, and being probably the result of the poisonous influence of the gas on a congested lung.

General Symptoms. — Among these, the most constant is disordered circulation, manifested by a frequent and rather full and sometimes hard pulse, which becomes small when the inflammation is very violent, but acquires volume after bloodletting. We are taught to mistrust acute bronchitis, in the course of which an intense febrile disturbance supervenes, even although expectoration and auscultation should not furnish any characteristic signs of

pneumonia. A chill is the customary prelude or announcement of the inflammation of the lung, and the fever thenceforwards lasts as long as the disease. A very frequent pulse is a bad sign in pneumonia, as it indicates intense inflammation. Rarely does the case terminate favourably when the pulsations exceed 140 in a minute. Coinciding with this morbid state of the circulation is the frequency of the respiratory movements; and when this correspondence is destroyed by the pulse becoming slow, and yet the respiration remains much hurried, we have reason to fear a fatal result; in fact, approaching death. Should the pulse be still frequent when the other morbid symptoms have in a great measure disappeared, there are probably some remains of phlogosis. If intermittent, we are to attribute it to some disease of the heart. The belief entertained by the old writers, and still accredited by some of the moderns, that the fever precedes the pneumonia which is the effect of the former, is not correct.

The febrile suffusion of the cheeks is sometimes more manifest on one side, and this we read is that which corresponds with the side of the affected lung; but in this respect there is no uniformity. The redness of one cheek more than that of the other may depend on the patient's habitually lying on one side. Disorder of the digestive functions is chiefly manifested in anorexia and a white and somewhat loaded tongue. There is not much thirst. The cutaneous exhalation differs in different cases; the skin is often dry from the beginning; at other times bedewed with moisture, which is converted into a copious sweat. This last symptom, generally described as either indicative of a milder disease or of an approaching crisis, I have found, not seldom, to precede a fatal termination; and hence, unless a free and particularly a viscous sweat be associated with favourable symptoms, indicating an abatement of the inflammation, it ought to be regarded with mistrust. If the skin has remained dry through the whole of the period of the disease, and towards the decline of the latter it is covered with sweat, we may regard this as critical and of good augury.

Without attaching to it all the importance which it is thought to merit by the gentlemen themselves, I shall repeat in their own language what Drs. Bright and Addison say respecting pungent heat of the surface, as diagnostic of pneumonia: —

Of all the symptoms of pneumonia, the most constant and conclusive in a diagnostic point of view is a pungent heat of the surface; by this symptom alone the first stage of pneumonia may in most instances be readily recognised; by this symptom alone pneumonia has been repeatedly pronounced to exist, before asking a single question, or making the slightest stethoscopic examination of the chest. The presence of this symptom will seldom mislead even in the most complicated forms of inflammation within the chest. It is by no means contended that it is necessarily present at some period of every case, although that is not probable; but it may be safely affirmed, that when inflammation is confined to the chest, however

varied may be the tissues involved in the inflammatory process, provided this symptom be present, pneumonia may be confidently pronounced to form a part in nineteen cases out of twenty, and perhaps in a larger proportion. A similar pungent heat of the surface is now and then observed in certain forms of renal dropsy; more frequently in continued fever, especially in children; and still more commonly in the eruptive fevers of the exanthematæ and erysipelas; and as such cases may supervene upon already existing disease within the chest, the fact ought to be carefully remembered. —*Elements of the Practice of Medicine*, p. 241–2.

The urine is of a deep red during pneumonia, and deposits a lateritious sediment at its decline. But among the glandular organs, there is no one, the functions of which are so disordered in this disease as those of the liver. Inflammation of the right lung is often attended with hepatic irritation, and the flow of bile is followed by bilious vomiting or stools. In other cases the liver is differently affected: the biliary secretion is impeded, and then predominates what is called the bilious diathesis. This is the bilious pneumonia of Stoll and other writers, and is a complication quite common in our Middle and Southern States. The tongue, eyes, and skin, are yellow; the patient exhales what has been called a bilious odour, and he is tormented with cephalalgia in the lower part of the forehead, head, or back of the eyes.

There is not, often, much disorder of the nervous system in pneumonia. When delirium occurs, we must regard it as the result of cerebral complication rather than a regular symptom of the disease. It is most apt to supervene on the sixth day, or from this to the ninth. At times, however, there is great prostration of force, and from the very outset an adynamic or typhoid state manifests itself. This is most common in old persons. To this complication I shall refer under the title of *typhoid pneumonia.*

The *precursory symptoms and diseases* on the invasion of pneumonia are various. Some of its complications will be spoken of at this time. Sometimes the patient has felt, for a few days preceding, discomfort, fatigue, anorexia, disinclination to motion, without either auscultation or percussion indicating pneumonia. Occasionally, a day, or two or three days, before the attack, a slight fever, like that which precedes variola, scarlatina, measles, &c., accompanies the preceding symptoms. This is the inflammatory fever which, in the opinion of some writers, always precedes the local malady. In some cases all the organs are threatened in succession with disease: to-day, the patient complains of gastric symptoms; to-morrow, of a tendency to cerebral congestion; subsequently, to rheumatic pains; until, finally, the pneumonia discloses itself. M. Andral has seen pulmonary inflammation preceded by two paroxysms of intermittent fever, and during the cold stage of the third a slight cough supervene, pain appear, the sputa of a characteristic nature; and, in fine, all the symptoms of pneumonia evinced. Sometimes pneumonia succeeds bronchitis; the inflamma-

tion, at first limited to the large bronchia, extends to the smaller ones, and finally to the vesicles. Nothing is more common than the union of these two diseases; so much so, indeed, that some have declared that bronchial inflammation exists in every case of pneumonia. In the greater number of cases, however, there are no precursory phenomena, and the patient is all at once seized with a chill, and pain in one or other side. Commonly the chill precedes the stitch; at other times the order is reversed; or, again, there is neither pain nor chill, but cough and fever are the first declaratory symptoms. When pneumonia supervenes on violent fevers, it is preceded by great dyspnœa. Occasionally, I may say not unfrequently, in fever, the pulmonary inflammation is not revealed by any symptom, and its presence is only proved by dissection. Broussais records instances of this in the intermittent fever which attacked the military in the hospital at Bruges; it is far from uncommon in our intermittent fever in the United States, and especially in that marked variety of it called of late years the congestive. I have had occasion when describing the organs affected in epidemic cholera, to mention the congested lung in many fatal cases of that disease. This state was most evident in the stage of reaction.

In subjects worn out by cancer and other chronic diseases, Laennec has pointed out the occurrence of pneumonia, which soon ends in coma, tracheal rattle, and death. The bronchial affection of measles sometimes passes into pneumonia, especially if the eruption is repressed or disappears suddenly; but in this case the symptoms are commonly urgent and sufficiently characteristic. Pneumonia is sometimes produced in gouty and rheumatic subjects, and this, says Dr. Williams, may occur either vicariously, so that the limbs are relieved, or conjointly with the affections of these. P. Frank has remarked that, in rheumatic subjects, pneumonia sometimes terminates without any expectoration, and with a copious discharge of clear urine, amounting to twelve pounds and upwards. This curious fact is another evidence of the connexion which subsists between rheumatic and gouty affections and a diseased state of the fluids of the body. Several surgical writers have noticed the occurrence of pneumonia after amputation and other great surgical operations, and likewise after extensive wounds; and it has been supposed that this disease is frequently the cause of death in these cases. I well remember to have heard Dupuytren frequently speak in his clinical lectures (1820–1), at the Hotel-Dieu, of this always troublesome and not seldom fatal sequence of amputations, particularly in scrofulous subjects; and so impressed was he with the necessity of some preventive measures, that he uniformly directed a blister to be applied, and a discharge established, commonly on the chest or the inside of the arm, before he removed the diseased limb.

I revert now to the complications of pneumonia with bronchitis, and particularly of that modification called *typhoid pneumonia.* I shall first let Dr. Williams speak on the subject, and afterwards introduce the instructive observations of Dr. Stokes.

The form of pneumonia that is called typhoid, whether it be secondary to continued fever, or whether it be primary and assume the typhoid type, from a constitution lowered by excesses, or by the depressing influence of foul air or of an unhealthy season, differs remarkably in many of its phenomena from the common pneumonia. The local symptoms are by no means prominent; and although there may be pain, cough, and very imperfect breathing, the obtuse state of the mental faculties prevents attention from being drawn to them. But the general functions are greatly disordered; the pulse is quick, small, and weak; the skin is harsh, dry, and partially hot, or covered with a clammy sweat, and sometimes spotted with petechiæ; the tongue is furred, brown, and dry; the alvine excretion dark coloured and otherwise disordered; and the urine is scanty, turbid, and ammoniacal. The lungs in such cases are sometimes found so engorged after death, particularly their posterior portions, that they sink in water; the texture is very soft and fragile, and when broken exudes a dark grumous blood: there is only an imperfect approach to hepatization, but the texture in some parts occasionally shows a softening of a lighter colour, which seems to be an imperfect suppuration. In these cases we find dulness on percussion and absence of the vesicular respiration in the posterior parts of the chest: but no crepitation; or if it be present, it is of very short duration. In the anterior parts of the chest the breathing may be distinct enough, and accompanied by sibilant and sonorous rhonchi. Now I cannot, says Dr. Williams, help viewing these cases as of a congestive rather than of an inflammatory character. By some unknown cause, whether in the condition of the blood or in the affected capillaries, or in both, the blood stagnates and accumulates in particular viscera; generally to some degree under the influence of gravitation; and the functions of the organs are proportionately impeded or disturbed. There is, at the same time, more or less irritation, which may give this congestion somewhat of an inflammatory character; but its products are imperfect and irregular; and neither in the effusion of lymph nor in the formation of pus is there manifest a true inflammatory orgasm. We can see why, in the lung, this condition should be unaccompanied by the usual signs of the gradual formation of a crepitating obstruction, because the engorgement is at once produced, and renders a great part of the tissue impervious to air. But this degree of congestion, if it occupy the middle parts of the lung, may give bronchophony and bronchial respiration.

Typhoid Pneumonia. — Dr. Stokes, whose description of the disease I shall give without interruption, introduces the subject of typhoid pneumonia by the remark, that — Under this head we may conclude a variety of cases, in which, whether from the low state of the constitution, the complication with other local diseases, or the pulmonary affection being secondary to a *general morbid condition*, we find a pneumonia often more or less latent and accompanied by extreme prostration.

This disease, so frequent in Dublin, at times, indeed, almost epidemic, has been long noticed under the names of the putrid,

bilious, typhoid, or erysipelatous pneumonia, and various theories as to its nature have been successively formed and abandoned. All this arises from not recognising the fact, that pneumonia may occur as a secondary affection in fever, or other morbid conditions of the whole system, and that its complication, with one or more local inflammations elsewhere situated, may give it a typhoid character. We cannot say that there is any specific typhoid pneumonia; but we find that, under a variety of depressing circumstances, conditions of the lungs more or less analogous may be induced, presenting the characters of the disease as given by various authors. Among these I may refer you to Huxham on Fevers; Stoll, *De Peripneumonia Vera;* also Burserius, who has described an erysipelatous pneumonia. In the writings of Good, Williams, Mackintosh, and Andral, the disease is noticed. Louis merely alludes to the occurrence of hepatisation in typhous fever. *Recherches sur la Gastro-Enterite.* In the earliest editions of the *Histoire des Phlegmasies*, the statements of Broussais, written before he had formed his theory of fever, may be studied with great advantage. He recognised the secondary and complicated pneumonia of typhus, the latency of the disease, and its slow resolution. P. Frank has described several varieties of the disease; of these, the *nervous peripneumony* seems most like the disease as met with here.

This disease is seen most frequently in hospital than private practice—a fact strongly illustrative of its connection with the low state of the system. I have observed it in the following cases:—

1st. As a complication with enteritis, or gastro-enteritis.
2d. Complicated with true typhus.
3d. Occurring in cases of bad erysipelas.
4th. Supervening in cases of the diffuse cellular inflammation.
5th. Complicating the delirium tremens from excess.
6th. As a consequence of phlebitis.
7th. As apparently the sole disease.

Now, although these cases must be considered different as to their original nature, yet, with respect to the pneumonia, they have a certain agreement; for the affection is more or less latent, presents similar physical signs, and requires that the antiphlogistic treatment should be employed with extreme caution, and in many cases that the free and early use of stimulants should be resorted to. Of the cases above noticed, those complicating typhus fever are most frequently observed.

Under these circumstances, patients present the general indications of typhus, and frequently the signs of enteric irritation, with the physical indications of pneumonia. I say the physical indications, because the symptoms are often completely absent. A dusky hue of the face, and a trifling cough, with or without expectoration, slight dyspnœa, and acceleration of breathing, may occur; but the patient rarely complains of his chest, even though extensive and fatal disease may exist. This, indeed, is one of the diseases in which the practical utility of auscultation is most frequently seen; and again and again will the stethoscopist detect an inflammation

of the lung, which has occurred without cough, pain, dyspnœa, or expectoration. The question, as to how far the existence of a typhoid character implies that the disease is secondary to typhus, or some other morbid state of the system, whether general or local, is still an open one. On this subject my experience is, that, although in most cases we meet with the disease in its complicated forms, yet it may occur as the sole affection: thus I have observed it more than once from contused injuries of the chest. I have seen many cases in which no symptoms whatever of enteritis existed, in which patients recovered under treatment directed solely to the chest; and though I have often found the ileum extensively ulcerated, yet this is not an essential characteristic of the disease, inasmuch as in other cases there was no appearance of gastro-enteritis in any form. These facts show that a complication with abdominal disease is not constant in this affection; and we must explain its characters on some other principle.

Nor does the actual complication with enteric inflammation necessarily imply a typhoid condition; for I have seen a well-marked case of pneumonia with severe enteritis, in which the most active and repeated bleedings alone succeeded in reducing the disease.

In the case of complication with enteric disease, we find pneumonia either secondary to, or coeval with, the abdominal affection; of these, the first is most frequent, but the character of comparative latency may be seen in both. There are two reasons why pneumonia of this character should be always more or less latent. First, the general law which regulates the latency of all inflammations occurring in that state of the system where fever and diminished nervous energy exist; and next, the circumstances of its being complicated with disease in other parts. The manifestation of inflammatory disease is always in proportion to its localisation and simplicity. If there happen to be two or three inflammations going on at the same time, a kind of balance is established, and the symptoms of each are less apparent.

As a complication in typhous fever, we may observe this disease in three forms. In the first, a bronchitis exists for several days, and passes ultimately into a pneumonia, the lower part of one side becoming gradually dull, with a humid crepitus. In the second variety, we observe no difference between the mode of invasion or physical signs, and those of the ordinary disease; while the third presents that sudden solidification which has been already described. Of these, the second is by far the most manageable form.

In most cases, even where inflammation of the pleura has occurred, the patients feel no pain; the blood is often diffluent and dark-coloured, like that in typhus, though occasionally presenting the buffy crust. Another point of resemblance among them is, that though the disease is generally formed with rapidity, its resolution, as compared with that of the sthenic pneumonia, is extremely slow; chronic hepatisations, with or without a low hectic fever or a lurking congestion, may continue for many weeks. And although, under

proper treatment, the disease may be ultimately eradicated, yet atrophy of the lung, with or without ulcerative disease, is often established.

But one of the most interesting and least appreciated forms of this disease, is that which occurs in delirium tremens. This complication seems essentially to belong to the delirium tremens from excess; I have never seen it in that from the want of stimulants. This disease commonly attacks the left lung, particularly in its lower portion, and is constantly overlooked. In many cases I have found, continues Dr. Stokes, that it was not the only local inflammation, but that gastritis, and in some instances a low pericarditis, coexisted. I have no doubt that, in many cases of delirium tremens, the fatal result is owing to this complication of disease, but particularly to the pneumonia, which I have seen to produce suppuration of nearly the whole lung, when its existence was never even suspected.

In all these cases the patients had either been treated by stimulants from an early period of the disease, or, which comes to the same thing, had continued indulging in spirits until a few days before death. And I have seen, says Dr. S., in such cases, the stomach, heart, lung, and brain, simultaneously inflamed. Although we cannot admit with Broussais that delirium tremens is nothing but gastritis, yet the frequency of the latter, in cases of excess, is not to be denied. The other diseases, too, are analogous; and it remains to be proved whether they are coeval with the gastritis or the result of sympathetic irritation.

These diseases are always more or less latent; a fact explicable by their mutual influence, and by the severity of the nervous symptoms.

The terminations of typhoid pneumonia are various; it may rapidly produce a fatal hepatisation; it may form gangrenous abscess; or induce a chronic solidity of the lung, passing into the tubercular condition.

One of the most interesting circumstances to the practical physician is the extreme slowness of its resolution, as compared with the sthenic pneumonia. Months may elapse before the respiratory murmur is restored, and in many cases this is never completely reëstablished. The fact already mentioned, that contraction of the chest has been only met with in these cases, shows the slowness with which the disease is removed. There is, however, one case in which, from conversion, a rapid subsidence of the pulmonary disease occurs. Thus I have seen the signs of pneumonia subside in a single day, on the occurrence of a gastritis or enteritis; and something of this kind may be suspected when there is a sudden and complete resolution of a typhoid pneumonia. — *Diagnosis and Treatment of Diseases of the Chest.*

The *progress* of pneumonia is well and tersely described by Andral (*op. cit.*). From the first to the second day of the disease, pain, chill, impeded respiration, cough without expectoration, crepitating rhonchus, resonance of the chest and fever, are the

observable phenomena, and those which constitute the first period of the disease. From the second to the third day the expectoration is distinctive, by its becoming viscous and variously coloured. The crepitating rhonchus (crepitation) is more evident, the resonance of the chest is weaker on the side in which the pneumonia exists; the pain is less acute than at the beginning, but the dyspnœa is increased; the patient lies on his back; the fever is violent, skin dry, sometimes moist. If resolution be not effected at the first stage of the disease, or that of engorgement, and the symptoms be more intense, the second stage is reached; and then the laborious breathing is increased, the speech is tremulous, the tenacity of the sputa is augmented, as is also the dulness of the chest on percussion; crepitation disappears and yields to bronchophony; the pulse is strong, frequent, and full, or it is either really or apparently feeble. At this stage the pneumonia may terminate suddenly by asphyxia, or its resolution may still be brought about. In this latter case there is an abatement of the symptoms and approach to convalescence. If the pneumonia reaches the third stage, the expectoration in the larger number of cases is watery and brown, and more or less like plum-juice. Commonly, also, the face becomes pale and cadaverous some days before death. There are no definite periods for the several stages of pneumonia to be gone through. Sometimes suppuration takes place at the fifth day; and sometimes the lung is only in a state of red hepatization by the fifteenth and even the twentieth day. Whatever may be the degree and kind of pneumonia, it pursues a uniform course with evening exacerbations.

In some cases, after the subsidence of pain and all the unpleasant symptoms of pneumonia, and when the patient is congratulating himself, and praising his physician for the removal of his disease and speedy restoration to health, things take a most unexpected turn. The pulse becomes slow and weak, the skin cool, then cold: sweat oozes from every pore, but to increase the coldness and weakness. If the patient is asked how he feels, his reply is,—"quite comfortable;" his only complaint is, that he cannot sleep. Uneasy at this new state of things, the physician who had probably already allowed his patient light nutriment, now makes it more stimulating, by substituting animal broths for sago, or arrow-root, panada, and bread and tea. He directs, also, wine and water at intervals, and warm applications to the feet, and frictions of the skin generally. No reaction taking place, and the serous oozing from the skin still continuing, more like that in epidemic cholera than any other morbid state, powerful stimuli are prescribed, — such as volatile alkali, wine whey, hot brandy and water, and opium in small and repeated doses internally, and sinapisms and blisters externally; but all without avail. The patient becomes weaker and weaker, and finally expires without pain, and with less pulmonary oppression than is common with the dying. In this brief sketch I have had in view an actual occurrence. It was in the case of a patient of my

own who had been bled twice; the first time sixteen, the second twelve ounces, for pneumonia with a severe stitch in the right side. A blister subsequently applied removed this pain; calomel and tartar emetic with a little opium were given; and in the course of four or five days the patient seemed to be out of danger; his pulse good, breathing easy, expectoration free, decubitus natural. In this comfortable state, taking light nourishment and using some mild diaphoretics with opium, he remained two days, after which the symptoms already described began to appear. The period of sinking and collapse was of three days duration, during which nothing seemed to arrest the progress towards death; nor indeed to impart even temporary force to the pulse or warmth to the skin.

With so vivid a recollection of the case, made to me more interesting by the estimable character of the man who was its subject, I was attracted by the heading of a paper in the *Edinburgh Med. and Surg. Journ.* (1840), entitled, "Remarks on Collapse occurring during the Treatment of Acute Pneumonic Diseases, by Mr. Kerr, of Paisley." This gentleman gives the outlines of three cases, two of which were fatal, resembling the one which I have just described. He does not speak of their putting on any of the symptoms of typhoid pleurisy or pneumonia. Mine had nothing of that character at its onset; but, on the contrary, exhibited all the symptoms of well marked acute pneumonia.

The mean *duration* of pneumonia is from twelve to twenty-five days. In some cases it terminates in two or three days; in others, has extended to thirty and even forty days.

LECTURE LXVIII.

DR. BELL.

PROGNOSIS AND TERMINATION OF PNEUMONIA.—Critical evacuations and critical days—Age modifies results—The old and young most apt to sink under pneumonia—Part of the lung most liable to inflammation—Which side most affected—Complication with other diseases increases danger—*Morbid Anatomy of Pneumonia*—Varieties of pneumonia—Participation of the pleura with the lungs.—*Causes*—External and internal—Climates and countries in which pneumonia prevails most—Is a common disease in southern Europe—Winter and first spring months the chief seasons for pneumonia—Immediate or exciting cause—Particular employments less apt to cause the disease than is supposed—Internal causes,—liability of the disease to return in the same person—tuberculous phthisis—Age—young children most liable—Sex—men much more liable than women.—*Treatment*—Great mortality in pneumonia—Venesection the chief remedy, to be early and freely used—Dr. Stokes's plan of treatment;—not frequent venesection;—local bloodletting preferable;—wine in conjunction with local bleedings in typhoid pneumonia;—M. Louis's results adverse to bloodletting,—antimonials and calomel; mode of using tartar emetic, and general advantages of the practice; combination of calomel and tartar emetic; calomel best in hepatization; posture to be attended to in these cases; seton in protracted cases with dilated bronchia.

PROGNOSIS AND TERMINATION.—The prognosis in pneumonia is always serious, although physicians are not agreed as to the propor-

tionate mortality; some rating it at one in three, others at only one in twenty; and one in fifty, and even sixty cases. Even of the probable result of cases apparently favourable, as measured by the symptoms, we ought to speak with caution. Our opinion will be modified by the stage of the disease, its duration, and the tendency to a crisis by spontaneous evacuation. A very frequent pulse, as when it is 120, and hurried respiration, are bad signs; so is an obstinate cough with scanty or difficult expectoration. The character of the expectoration will guide us materially in prognosis. Thus, in simple pneumonia the viscidity and rusty tinge of the sputa are in exact proportion to the intensity of the inflammation, and their increase in quantity and diminution, or tenacity and colour, are the common attendants on resolution. Dirty or watery-brown sputa and those containing pus, import great danger, inasmuch as they indicate the probable supervention of the third stage, and a gangrenous odour generally implies a state of great peril. The sudden suppression of expectoration is generally an unfavourable sign; for although the disease may be resolved without any increase of the expectoration, yet this has always a favourable influence, and contributes greatly to the cure. A dry, harsh state of the skin attends bad cases complicated with gastric disease, exhibited in a loaded or parched tongue, great thirst or sickness, and tenderness of the epigastrium. A moderately perspirable skin is the most favourable state; profuse perspirations, as I have already stated, sometimes occur in fatal cases. The same has been remarked of diarrhœa, yet both these discharges occasionally prove critical. A copious deposit in the urine may be generally viewed as a favourable sign; and the observation of Hippocrates seems to be commonly true, that if, after having been turbid, the urine becomes clear before the fourth day of the inflammation, a fatal result may be anticipated. Delirium is generally considered to be a symptom of great danger; and it is the more so when it is constant and not merely the temporary effect of the nightly febrile exacerbations; but in hysterical females it is of less importance. Equally fearful is a comatose or lethargic state, as it shows that the functional disorder has greatly encroached on the strength required for the necessary treatment.

Of the evacuations regarded as critical, Laennec believed the lateritious sediment in the urine to be the most common: Frank and Andral describe perspiration as more frequent. Dr. Williams, whose summary of opinions I am now making use of, believes that the two are commonly conjoined; and there seldom occurs in pneumonia, a perspiration that can be called critical, without, at the same time, a deposit in the urine. A copious expectoration of a critical character does not occur so often as is described by Sydenham and Cullen, and, indeed, by the older writers generally. Andral, confirming the opinions of Hippocrates and other writers, says that there are certain days in the duration of the disease in which there is a great tendency to amelioration. Of ninety-three cases, he found that twenty-three gave way on the seventh, thirteen on the eleventh,

eleven on the fourteenth, and nine on the twentieth days. The recoveries in the remaining cases commenced in twelve out of forty-two non-critical days, as many as eleven being ascribed to the tenth day. Thus the recoveries on critical days averaged as high as fourteen, while those on non-critical scarcely exceeded three.

The age of the subject will modify our prognosis. In children the inflammation continues for a much longer period in the first stage; after some weeks duration presenting only some hepatised points at the margin of the lung or in isolated lobules. The same peculiarity has been noted by Laennec in certain epidemics. On the other hand, there is a remarkable tendency of pneumonia in old and debilitated subjects to pass rapidly to the state of purulent infiltration, — even within a period of twenty-four to thirty-six hours after the inception of the disease. Gangrene, though it generally portends death, does not necessarily terminate in this way. A strong constitution and youth have sufficed to triumph over this sinister state of things. The extent of the inflammation modifies greatly the prognosis. Thus a double pneumonia affecting both lungs at once is frequently fatal, even in the first stage; and whenever the whole of one lung is involved there is much danger of an unfavourable issue.

The part of the lung that is inflamed will not be without its influence on our prognosis. It has been a question, disputed by different writers, as to the relative frequency of inflammation of the upper or lower portion of the lung. Andral's statistics on this point are in favour of the predominance of the latter. Of 88 cases of pneumonia, in 47 the inflammation was of the inferior lobe, and in 30 of the superior lobe, while in 11 the entire lung was affected. There is, however, a greater risk of fatal result when the upper lobe is the part inflamed. The cause of this, according to Dr. Williams, appears to be that the disease of the upper portions and root of the lungs obstructs the passage of blood and of air in the larger vessels, so that the peripheral parts unaffected with inflammation do not receive their due supply.

From the combined observations of Andral, Chomel, and Lombard, Dr. Forbes has shown, that out of a total of 1131 cases, the right lung was affected in 562, the left in 333, and in 236 the disease was double; the general result of which would be, that, out of every ten cases, five would be of the right, three of the left, and two double. This result is probably near the truth, and corresponds pretty closely with Dr. Stokes's experience; but, adds this gentleman, it will be found that the double pneumonia is more frequent than appears from the above statement. It commonly happens that, notwithstanding a great preponderance of disease in one lung, a careful physical examination will detect more or less of it in the other, even though no local pain or distress exist, which could lead to its detection.

The complication of other diseases with pneumonia increases the danger; as in the case of fevers and the exanthemata, and the more

formidable is the inflammation in these cases because it is often latent. Pneumonia occurring in the course of a phthisical disease is seldom severe in itself, but it has a tendency to accelerate the development and softening of the tubercles. This inflammation is more than usually fatal in pregnancy and the puerperal state. It is especially dangerous at the extremes of life, more particularly in weakly infants and in cachectic old people, and those exhausted by habitual excesses; and the fatality is much greater among the lower classes than among those well and regularly fed and clothed.

Morbid Anatomy of Pneumonia.—Many of the details under this head have been anticipated in my remarks on the different stages of the disease, and the anatomical characters of each. These I shall not repeat. I may advert to the varieties of pneumonia, viz., *vesicular*, *lobular*, and *lobar*, according to the part and extent of the organ affected. Inflammation attacking the vesicles, the parenchyma remaining intact, is vesicular pneumonia. But in what does this differ from vesicular bronchitis? Or, again, the inflammation may attack not only the separate vesicles, but all the vesicles of a lobule, without the parenchyma being affected. All parts of the lung may suffer in this way; but the lesion is most manifest at the external portions, the root, the inferior lobe, and the central vesicles. This will constitute *lobular pneumonia*. Finally, the entire lobe of a lung and all the lobes of a lung may be seized with inflammation, constituting *lobar inflammation*. Lobular pneumonia is most common in children.

Inflamed bronchia, so common an accompaniment to pneumonia, are, of course, seen in fatal cases of this latter. The attack is often begun by bronchitis, which may mask the other disease. Sometimes bronchitis is consecutive on the pneumonia. Mechanical alteration of the bronchia, sometimes noticed in fatal pneumonia, consists in their obliteration, which always begins in those of a medium calibre. More frequent still are the cases in which the pleura participates in the inflammation of the lung proper. This state is recognised after death in an injection of varying distinctness, in albuminous concretions, slight serous, purulent, or bloody effusions. Pleuritic effusion is seldom extensive when pneumonia coexists with the pleurisy.

Causes. — The causes of pneumonia may be considered under the two heads,— of those external, and those connected with the individual himself. The first include climate, season, and atmospherical exposures in general. Pneumonia is a rare disease in hot latitudes; but if scarcely known in the East Indies, it is of occasional occurrence in the West Indies. In southern Europe it is far from being uncommon; as we learn that in the Archipelago and Greece there is one case of pneumonia to thirty-eight cases of disease in general. Of the Ionian Islands, Corfu is said to suffer most from this disease. The gradual substitution of pulmonary for hepatic disease is shown in the English troops returning from India losing the latter and becoming subject to the former. In Italy pneumo-

nia is a quite common disease. At Pavia, it appears, from a return made for a period of three years, that in the first year one-seventh of the cases received into the hospitals were of pneumonia; in the second year, the proportion was a sixth; and in the third year, a quarter. At Padua, the proportion is very variable; being at one time a fifth, at another a sixteenth, then a twenty-third, and even a fifty-eighth. At Wilna (Russia), the proportion is one in seven to one in eight. Pneumonia is very common in Rome, — a fact long ago pointed out by Baglivi; indeed, there is hardly any difference in this particular between that city and London. There is good reason to believe that inflammation of the lungs is a prevailing malady along the whole European coast of the Mediterranean; in regions and districts, the climate of which has been long supposed to display a sanative influence in all chronic and pulmonary diseases, but in a more especial manner on consumption. I shall most probably have time to point out more formally, hereafter, this fallacy. At Nice, Genoa, Pisa, and Florence, the disease prevails greatly, and cuts off many of the inhabitants. The neighbourhood of Naples, or around Mount Vesuvius, is remarkable for this occurrence. Here it may be called truly endemic, especially by those who attribute it to the noxious exhalation which prevails there. To more recognised climatic influences should we attribute the endemic character of pneumonia in northern Europe generally, in which we must include Great Britain.

There is not entire uniformity in the seasons, even in the same latitudes in which pneumonia is most rife. In general, however, it may be said that the latter winter and first spring months give the largest number of cases in northern and middle Europe, and in the United States. In the West Indies, on the other hand, the maximum of frequency is in summer. In Paris, the chief months are January and April.

The immediate and exciting cause of pneumonia is represented to be sudden transition from a warm to a cold medium while the body is heated, and especially in a state of perspiration. Facts justify this explanation in many cases; but in many more, perhaps the majority, it does not apply; and we are fain to suppose a peculiar predisposition by which certain individuals under common exposures contract pneumonia. Still, knowing the seasons and districts in which the disease is most prevalent, we can hardly refuse believing that a sudden and concentrated application of these atmospherical influences, in the manner just described, should count largely in our inquiries into the causation of pneumonia. The epidemic occurrence of the disease is clearly proved, although even here, again, we shall be at a loss to account for the fact in any known and appreciable imitations and combinations of states of the atmosphere.

The influence of particular employments, in which those engaged are much exposed to cold and humidity, has been greatly overrated, as we learn from Thackrah, among others. Regularity in other respects, and particularly avoidance of alcoholic stimulation, renders

exposures of this nature, and even sudden transitions from high to low temperature, comparatively innocuous.

That there are internal causes, a special but not *à priori* recognisable predisposition, by which pneumonia is readily developed and renews its attacks in certain persons more than others, we can hardly doubt. Authors relate cases in which the same person has had the disease repeatedly; Dr. Rush mentions twenty-eight times; M. Andral sixteen times in eleven years; and M. Dezoteu fifteen times. Perhaps the chief predisposing cause, at any rate the one depending on recognised peculiarity of organization, is tubercles of the lungs. Seldom is there a case of tuberculous consumption in which pneumonia is not developed; and often I have seen it near the close of the disease rendering its removal in the then exhausted condition of the patient, who is sinking rapidly into death, a matter of great difficulty. The influence in this case is, however, reciprocal; for pneumonia, though it does not directly cause, yet it develops the production of tubercles. Pneumonia may supervene on chronic bronchitis; and still more readily and frequently on acute pleurisy. It complicates sometimes dothinenteritis, as also measles, scarlatina, and small-pox, and follows the suppression of any of these eruptions; as indeed it does of less acute ones. Phlebitis is sometimes associated with it. Chronic inflammation of some other organ singularly predisposes some individuals to pneumonia. One of the most severe cases of the disease which I ever met with, if measured by the structural changes in the lungs, terminated the life of a lady who had for years suffered under chronic gastritis with softening of the mucous membrane of the stomach.

Age has an influence on the ætiology of pneumonia. All ages are declared by M. Andral to be subject to pneumonia. It has been known to attack the fœtus *in utero;* and it is quite common in children, rather less in adult life, and prevalent in old people. Guersent reports the disease to be very common and fatal among children, and that, of the deaths in the hospital of sick children at Paris, before the completion of the first dentition, three-fifths occur from pneumonia which is chiefly latent. Dr. Williams, from his own observations, is inclined to consider young children as more frequently the subjects of pneumonia than adults.

Sex displays a modifying influence, in the greater readiness of men to contract pneumonia. Out of ninety-seven cases which occurred in the wards *La Charité*, under the care of M. Chomel, seventy-three were men, although the number of patients in the hospital wards, of either sex, was nearly the same.

Treatment.—If inferences were to be drawn respecting the treatment of pneumonia from the proportionate number of fatal cases, we should be greatly at a loss to determine on which side the advantage lies; both owing to the fluctuations at different times in the same place, and the different results published by two sets of writers of the same cases. The great success of M. Laennec, under

the tartar-emetic treatment, in his only losing two out of fifty-seven cases, has been often quoted in his and its favour; whereas, if we are to believe in the critical accuracy of M. Bouillaud, the deaths were seven in number, leaving at this rate the mortality to be rather less than one in eight. In the *Charité*, in the years 1825 and 1826, the results of M. Laennec's practice was 12 deaths in 30 cases of pneumonia. M. Chomel very frankly admits, the deaths in his hospital practice were one in four; but M. Louis goes still farther, and rates it at one in three. M. Bouillaud, in summing up the results of the practice which he advocates, early and full bloodletting, reports in 102 cases 12 deaths and 92 cures, which is a mortality of 1 in 8½. M. Lacaze of Montgeron, near Paris, has published, in the *Journal Hebdomadaire* (1834), a statement of the treatment of 42 cases of pneumonia treated by large bleedings, which shows only one death out of the entire number. In the question of mortality and of treatment, you must, however, always remember that, as a general rule, with equal skill, and the same means employed in out-door practice as those enlisted in hospital service, the results will be in favour of the first. The class of persons who, in large numbers, are sent to hospitals, their prior mode of life, poverty, bad feeding, overwork, or excesses of various kinds, and the deteriorating influence of the air of a hospital, are all adverse circumstances against the favourable effects from a remedy or plan of treatment. On this account we cannot implicitly follow the practice pursued by hospital physicians, nor receive for our guidance their caution against a full antiphlogistic course of treatment in inflammatory diseases. The inability of their patients in the hospital to bear free depletion, ought not to be received as evidence of its inapplicableness to patients of even a similar age and temperament out of doors. I deem it the more important to introduce these cautionary remarks just now, believing that they will apply to the opinion of Dr. Stokes respecting his inculcation of restricted venesection in pneumonia; and with this reservation I now place his views before you.

Treatment of Pneumonia.—I shall here, says Dr. Stokes, consider the treatment of the simple inflammatory and the typhoid pneumonia.

Treatment of the Sthenic Pneumonia. — Of all parenchymatous inflammations, that of the lung seems most under the control of judicious treatment, if this be adopted at an early period; but if the disease be allowed to run on into its third or fourth stage, its treatment becomes much more difficult.

I find the bold and repeated use of the lancet to be unnecessary in the great majority of cases, and I am convinced that, in general, a single, or, at the most, two bleedings, will be sufficient. Out of many hundred cases, I have had only one in which it was necessary to bleed more often than twice; in this instance, there was a complication with hypertrophy of the heart. The true principle

seems to be, that general bleeding is to be considered only as a preparative for other treatment, and not the chief means of removing the disease. I have no doubt that too much has been said as to the necessity and advantage of large or repeated bleedings in pneumonia, and the mind of the young practitioner has been trained to consider them as his great resource, to the neglect of other necessary and important measures, and the consequence has been, that the cure is often purchased at too dear a price, or, what is more frequent, that the disease is only modified, but not removed. It is changed from a manifest to a latent pneumonia, the cough, dyspnœa, pain, acceleration of bleeding and fever are reduced, and the patient is considered as cured, while his lung remains solidified, or even passing into other disorganisation.

I am most anxious to press the importance of local bleeding, in the treatment of pneumonia, for I consider it as the principal remedy. For this purpose, either scarification by cups or leeches may be employed; but if the latter be used, I would, in all cases, recommend that the cupping-glasses should be employed in conjunction with them. In this way, the general fever and arterial excitement having been previously reduced by the lancet, we may, directed by the stethoscope, continue day after day to detract blood from the affected part, while the patient's strength can be supported by food, and even wine, if necessary, In the treatment of the typhoid form, the best practice is to use wine, in conjunction with local bleedings.

M. Louis has given the results of his experience, drawn from the numerical method, as to the effect of bleeding and other treatment in pneumonia: I shall give his conclusions in his own words:—

"1st. That bleeding has a favourable influence on the progress of pneumonia; that it shortens its duration; but that this influence is much less than is commonly believed; so that other things being equal, those patients who have been bled in the four first days of the disease were only cured four or five days sooner than those who have been bled at a later period.

"2dly. That we cannot cut short a pneumonia by venesection, at least during the first days of the disease. And if the contrary has been believed to occur, it is, doubtless, because we have confounded this disease with others, or that in some rare cases the first bleeding causes the general symptoms to subside rapidly, while the local phenomena continued for the most part to advance.

"3dly. That age has a great influence on the progress and termination of pneumonia.

"4thly. That the tartrate of antimony, in large doses, given in those cases when bleeding has been unsuccessful, has a favourable action, and seems to diminish the mortality of the disease.

"5thly. That blisters have no evident action on the progress of pneumonia; and that, without any loss, they may be banished from the treatment of those cases of pleurisy and pericarditis which occur in healthy subjects."

On these conclusions a few observations may be offered:

It is difficult to explain the results furnished by M. Louis's tables, with respect to bleeding in pneumonia. To find that, with the exception of the first few days, it matters little at what period we bleed, is indeed an unexpected result, and one which is opposed to the experience of all practical men in this country. It may be observed, however, that M. Louis has not separated the sthenic from the asthenic or typhoid pneumonia; and as we know that the lancet has comparatively little efficacy in the latter form, we must conclude, and without impugning the method or accuracy of M. Louis, that its value in the sthenic pneumonia is greater than what appears from these calculations.

In addition, it may be observed, that no mention is made of local bleedings having been employed in connexion with the lancet; had these means been extensively employed, there would, doubtless, have been stronger evidence in favour of bloodletting. It is certainly true that we can seldom cut short a pneumonia by bleeding. In two instances only have I seen this result, but the common effect of general bleeding is to remove or modify the constitutional symptoms.

In some cases the affection is merely converted from a manifest *into a latent but progressive disease*, while in others the lung continues unresolved, and in a passive condition. In such cases, tubercle, chronic induration and atrophy are commonly the results.

Under this treatment, the bowels having been emptied, and all exciting causes removed, the question will arise, whether the patient is to be treated upon the antimonial or mercurial plan. In deciding the relative merits of the two remedies, we have a difficulty *in limine*, from the absence of statistical information; in the want of this we must rest satisfied with those conclusions to which our every-day experience has led us. After ten years' hospital experience, I would state the rule which should guide us, to be the following: —

That the success of the antimonial treatment depends on, or is favoured by, the inflammatory character of the fever, the early stage of the disease, the absence of complication with other diseases, the fact of the patient having borne bleeding well, and the firmness of the coagulum; the more the case presents these characters, the greater will be the likelihood of the tartar emetic acting favourably. But in the typhoid, secondary, and complicated cases, in those where the powers of life have been previously injured, where bleeding cannot be used with boldness, and where stimulants are required, the exhibition of the tartar emetic, in full doses, is very hazardous. The mercurial treatment is to be preferred from its greater safety, and, in this disease, more than equal efficacy.

In the Meath Hospital, we have used the tartar emetic after the manner of Laennec; but its exhibition has been conducted on a different principle; for while he considers it as his chief remedy, we have always found it secondary to general or local bleeding.

The formula used is that already given in a preceding lecture on bronchitis.

It is while the crepitating *râle* is heard more distinctly, and before a complete solidification has taken place, that the remedy answers best. Indeed, in the advanced stages of the disease, and where the object is to remove a hepatisation, the antimonial is inferior to the mercurial practice; but the mere occurrence of hepatisation does not contraindicate the use of the antimony, if it be in the early stage of the disease, *and while the crepitating râle is advancing in other portions of the lung.*

We generally begin with the use of from four to six grains on the first day. The dose is increased by one or two grains daily, until ten, twelve, or fifteen grains, are exhibited in the twenty-four hours. I have never gone beyond this dose; but it must be remembered that the most careful attention was always paid to local treatment.

For the reduction of the ordinary inflammations of the lung in this country, our returns show that it is seldom necessary to administer more than from twenty-five to thirty grains of the remedy given in the doses above mentioned. In many cases, however, larger quantities have been employed; thus, I have often continued the exhibition of the remedy to the amount of fifty grains, and one case, where an acute double pneumonia was superadded to a chronic bronchitis, one hundred and seventy grains were used at the doses of twelve grains daily. The patient's symptoms and appearance daily improved under its use, and, during the latter period of its exhibition, his appetite and digestive powers were excellent. In this case, the recovery was perfect and permanent. In many cases, the first doses produce vomiting, and in some purging; but the effects generally subside after the first twenty-four hours. With respect to the interval of tolerance, I have constantly verified the statements of Laennec, and there is hardly a more interesting circumstance in medicine than to see a patient taken from eight to twelve grains of the remedy daily, without vomiting, purging, or sweating — without any effect, indeed, save the gradual removal of the pneumonia. This treatment is seldom followed by abdominal irritation. In one patient, after the use of eight grains daily for four days, violent vomiting, diarrhœa, and pain in the abdomen, supervened. These symptoms subsided under a sedative treatment, but returned, in two days, with such violence that the lancet had to be employed. In another case, the usual symptoms of poisoning with tartar emetic followed the first dose of the medicine; both these patients recovered without difficulty.

In those cases where the remedy has been borne well, it is not advisable to omit its use suddenly. We have seen frequently a severe relapse to follow this practice, but by diminishing the dose at the rate of a grain or two daily, these effects can be avoided. In those cases where the tartar emetic is not borne, or its use seems inadmissible, I have generally recourse to a mercurial treatment;

this is to be conducted both by the internal and external use of mercury. Calomel, combined with blue pill and opium, is to be administered every third hour, and its action assisted by mercurial frictions, and the application of the ointment to blistered surfaces. I have no experience in the treatment by very large doses of calomel, as recommended by Dr. Graves and Dr. Hudson.

Laennec has been severely censured for his statement, that the gastro-enteritis of fever does not contraindicate the use of the tartar emetic. I apprehend that in this matter he has been scarcely done justice to, for there is every reason to believe that he makes use of the term gastro-enteritis in the conventional mode then so prevalent in Paris, and in which gastro-enteritis and fever were convertible terms. There is no ground for believing that Laennec would give tartar emetic in acute gastritis; and his statement is reducible to this, that the remedy may be employed in the pneumonia of fever; and without entering into his reasoning on the subject, we must agree with him, that the contraindications to the use of this, as of all other medicines, ought to be founded on experience alone. It is now proved, that the existence of typhus fever does not contraindicate the use of tartar emetic, but that, on the contrary, its exhibition may be followed by the happiest effects; the *gastro-enteritis of Broussais*, then, does not contraindicate the use of this remedy.

But in conducting the mercurial treatment it must never be forgotten, that the direct antiphlogistic powers of the remedy are much inferior to those of tartar emetic, and, indeed, that their very existence may be questioned. I have always found that the mercurial action seems rather a result than the cause of the first reduction of disease. While the fever continues high, a complete resistance to mercurial action most commonly exists, and too often is precious time lost in the attempt to salivate, when a direct antiphlogistic treatment would have modified the disease, and induced the ptyalism. It will always be found that the facility of salivation will be directly as the reduction of the fever. This resistance to mercurial action is less frequently seen in the simple than the complicated cases of pneumonia, in which the curious symptom of vacillating mercurial action may frequently be observed; thus, in a case where the remedy has been exhibited for the space of thirty-six or forty-eight hours, the gums may become spongy and the breath mercurial, and everything seems to promise that the desired object will be fulfilled; but in a few hours all these appearances cease, the gums become again hard, and the fetor subsides; this is generally accompanied by an aggravation of symptoms, on the subsidence of which another of these attempts at ptyalism may be observed, and in the course of a single case this circumstance may occur three or four times; salivation is almost never established, and the case too often proves fatal.

In some cases I have found that the previous exhibition of tartar emetic seems remarkably to facilitate the mercurial action; and the reverse of this may also occur, and the happiest effects be seen from

tartar emetic, in cases where mercury has been previously exhibited. In many cases both modes of treatment may be employed.

Cases of unresolved hepatisations, in patients either apyrexial or labouring under hectic, are extremely common, as a result of routine practice and neglect of the stethoscope in the early treatment of the disease. In these cases mercury has a better effect than the tartar emetic, and the best treatment consists in its cautious exhibition, combined with repeated local bleedings and counter-irritation. In many cases I have employed the seton with the best effects. I have also used iodine, both internally and externally, but without decided advantage. These hepatisations are more common after the typhoid or asthenic pneumonia, and many weeks, or even months, may elapse, before the lung is restored to health: the cure is not unfrequently accompanied by atrophy of the lung and contraction of the chest, under which circumstances the resolution is pointed out more by the reappearance of the respiratory murmur than the clearness on percussion. But in these cases our efforts will often be nearly unavailing, unless careful attention is paid to the position of the patient, so as to relieve the diseased portion from hypostatic congestion. The patient is to be encouraged to lie on the opposite side, and where the posterior half of the lung is engaged lying on the face for a certain time every day will have the best effect. In many cases, where remedies seemed to have little or no effect, attention to position has been followed by a rapid recovery. See on this subject a paper by M. Gerdy, published in the *Archives Générales de Médecine*, on the Influence of Position in modifying the Phenomena of Disease.

It will also happen, whether in cases treated on the antimonial or mercurial plans, that the lung continues in a congestive state, accompanied with copious bronchial secretion. In this case the treatment recommended for the second stage of bronchitis is to be carried into effect, when the bronchial affection in general yields. In a few cases, however, the tubes become dilated, and though the constitutional symptoms disappear, the respiratory phenomena are not restored to their natural condition. This was well exemplified in the case of a gentleman of strong habit who was attacked with a violent double pneumonia, attended from an early period with a copious expectoration of mucus or muco-purulent matter; his life was long despaired of, but after removal to the country he gradually mended. A seton was inserted, and frequent changes of air had recourse to. In about a year and a half I again examined him; he had recovered his flesh, strength, and appearance, and only complained of a little dyspnœa on exercise; the whole chest sounded naturally on percussion, and the respiration over the anterior, postero-superior and lateral portions was healthy, while in both infra-scapular regions nothing was audible but an exceedingly large mucous *râle*. I again examined him, after the interval of some months, with the same results; and when we connect the physical signs with the history of the case, there seems little doubt of the correctness of my conclusion. It is obvious, that in a case

like this, an error may be committed by unavailing attempts at removing these physical signs, and the practitioner must rest satisfied with curing the constitutional symptoms, and not injure his patient by unavailing treatment. (*On the Diagnosis and Treatment of Diseases of the Chest.*)

LECTURE LXIX.

DR. BELL.

TREATMENT OF PNEUMONIA (*continued*).—Superiority of venesection over all other remedies—Extent of its use and frequency of repetition—Not to be deterred by fear of interfering with critical evacuations—Circumstances which modify bloodletting—Original strength of constitution; complication of pneumonia with other diseases—Purgatives—Revulsives and counter-irritants—Opium and other narcotics—Depression to be met by stimulants and mild tonics—Treatment of complications—bilious pneumonia,—the pneumonia of children—Less depletion required in the cases of children—Tartar emetic in their case—Regimen and drinks in pneumonia.—*Convalescence*—Cautions requisite in—*Treatment of typhoid pneumonia* by Dr. Stokes—Depletion less used, and stimulants more freely; complications to be attended to;—remedies for hectic with expectoration.—*Chronic pneumonia*—Physical signs of—Caution against much depletion in.

A FEW additional remarks including some points of treatment not noticed by Dr. Stokes will find place at this time. As respects venesection, too cautiously advised by Dr. Stokes, although I would not go as far as the late Dr. Gregory of Edinburgh, who was in the habit of saying in his lectures that, provided he was called early in pneumonia, he would be contented to dispense with all other aids than those of the lancet and water gruel, yet I cannot help regarding it as the chief remedy, itself superior to all other means, and not to be replaced by any other, or by all others. M. Louis's authority is invoked sometimes against bloodletting in pneumonia, which he says is neither shortened nor materially influenced by the remedy. But here is one of the instances of the fallacy of the numeral method. Without a careful specification of the constitution and habits of the persons whose cases are numbered by M. Louis, his estimates cannot be introduced as contradictory to the experience of both ancients and moderns in favour of free, or we might, as Dr. Watson properly does, say prodigal bloodletting. The abstraction of blood is productive of immediate and direct relief to the suffering organs which are now able to resume in degree their functions at once. To be most effective, venesection ought to be practised at the first invasion of the disease; an advantage which may be readily procured in private, but very seldom, if ever, in hospital practice. M. Andral advises free bleeding from a large orifice; but to stop short of bringing on syncope, to prevent which he advises that the patient be bled in a recumbent posture. Leeches and cups, which are of service in cases of pleuritic stitch, ought, as this judicious practitioner recommends, to be considered as *adjuvants*, but not a principal remedy, or substitutes for the lancet.

If we can bleed early, within the first twelve or twenty-four hours of the attack, and produce a decided impression just short of syncope by this remedy, we may then, as so strenuously recommended by Dr. Armstrong, give at once a full dose of opium, as of two or three grains, with a view of arresting the further progress of the disease. The efficacy of the opium will depend entirely on its early administration; after the first day we cannot hope for much from it, and when hepatisation has begun it will be injurious. How often should the bleeding be repeated? Dr. Stokes has just told us, not more than two; M. Andral says from three to five; and that, if the disease is very violent, blood may be abstracted twice in the same day, once in the morning and once in the evening. Some have bled fifteen to twenty times in a pneumonia. My own observations would induce me to press the use of the lancet without stint, where there is pleurisy associated with pneumonia, until the pain is removed and the breathing comparatively easy. It is hardly worth while to speak of a bloodletting which does not produce a decided impression: short of this it seems to aggravate the sufferings of the patient. On one occasion, a young woman, a dispensary patient, was directed by me to be bled, and she was bled, but not to the extent which I wished. I prescribed a repetition of the operation on the morning following the first venesection, but the quantity fell far short of the exigency of the case. In the afternoon of the fifth day of the disease, when I again visited her, I found her still suffering acutely. I now opened a vein myself, and let the blood flow until twenty ounces were abstracted. From that hour she was relieved, and her convalescence may be said to have begun at the same time.

We must not be restrained from a bleeding by a fear of its interfering with a crisis by expectoration or urine, if the inflammation be still great, and the symptoms urgent as at first. Bloodletting is best on the first day; it is good on the second and the third, and will often save life on the sixth and even the eighth day of the disease. After expectoration is freely established, and the sputa have lost their viscosity and rusty colour, and the breathing is easier, it would be imprudent, under an idea of accelerating the cure, to draw blood. Venesection in pneumonia is a remedy of necessity, not of precaution; nor is it one of cumulation, an increase merely of remedial impression for the removal of the disease. Bloodletting cannot be as efficacious in the hepatisation of pneumonia as it is in the primary stage of engorgement; but even here it often produces excellent effects; even, as M. Andral assures us, after the gray hepatisation in the suppurative stage. Not that we bleed in this case for the removal or absorption of the pus, but to relieve other parts of the lung in which hepatisation still prevails. Mere smallness and frequency of pulse will not deter us from using the lancet, if the accompanying symptoms indicate oppression rather than depression or prostration. The pulse in pneumonia, as in most of the phlegmasiæ, often rises and acquires volume after bleeding. Copious sweat has been regarded by some as a cause for our withholding

the use of the lancet; but I have already told you that often a warm sweat even accompanies some of the worst and fatal cases; and hence, that it is not critical, nor can its suppression be attended with deleterious efforts, if this result follows an abatement of the intense phlogosis which, in some cases, seems to keep it up. By some physicians the inflammatory buff and cup of the blood drawn are regarded as a necessary appearance to indicate and justify the repetition of the bloodletting. But on this point there is no uniformity; for in some of the worst and inflammatory cases of pneumonia, you will not see any buff in the blood.

Returning from this digression, let me conclude my remarks on the circumstances requiring and modifying bloodletting in pneumonia. In old persons we are too apt to be deterred from this remedy, under an idea that they are weak, and their systems will not react under the temporary depression caused by loss of blood. But this is a mistake, if assumed as a general rule. Original strength or weakness of constitution, prior health or disease, and the habits of the patient, are qualifying circumstances of more importance than those of adult or of advanced life. An old man of seventy, who has been habitually robust, healthy, and temperate, can part with more blood than a young man of twenty-five, of an anæmic or scrofulous habit, and weakened by excesses of any kind, — in the same disease. In the complication of pneumonia with eruptive fevers, some physicians are afraid to draw blood, — imposed upon by the small, frequent pulse, and predominance of nervous symptoms, great weakness, and apparent prostration. This is often the critical epoch, when bloodletting is most required to save the patient. It will be more necessary in these cases than in others, to aid in bringing on reaction by moderate stimuli, with small doses of opium and external warmth and frictions. A similar remark applies to the supervention of pneumonia on gout. The attack is still pneumonia, by whatever terms we may choose to qualify it; and if it is not removed by active treatment, it will kill the patient. The complication of pneumonia with typhous and typhoid fevers is a very common occurrence, and merits prompt attention. Congestion predominates over inflammation, and we cannot hope to free the lungs by full bleedings; but we may greatly relieve them, and simplify the diagnosis by small bleedings either from the arm, or preferably by cups to the chest, — on the sides, under the clavicle, and between the shoulders.

Although bloodletting is the chief, it must not be regarded as the sole available remedy in pneumonia. In the beginning of the disease and towards its decline tolerably active purgatives are administered with good effect. In fixed hepatisation we cannot promise ourselves much service from them. Counter-irritants, in the shape of sinapisms to the extremities and hot pediluvia, are generally and usefully prescribed. As revulsives, leeches to the vulva or the anus, in cases of suppressed menstruation or of hemorrhoids, shortly before the coming on of the pneumonia, are directed

in preference to their application to the chest. Blisters, a favourite remedy with nearly all writers, are beginning to be regarded with mistrust by some of the most judicious of our practical men. In the acute and febrile stages of the disease they are not to be relied on; and they irritate, often excessively, the patient, especially if he be of a nervous temperament. When prescribed, they ought to be either very early, or, a safer practice, towards the decline of the disease. In children we must trust more to counter-irritation than in adults; and hence, in cases of pneumonia, attacking the former class of subjects, we apply stimulating liniments rubbed on the skin, and irritate the lower extremities by liniments or sinapisms, warm bath, and blisters to the chest.

Drinks of the demulcent class are always preferred: but we must study variety, so that the patient may not have a distaste, or, in fact, a disgust towards them. We are cautioned against the free use of drinks, in pneumonia, as calculated to injure both by filling the bloodvessels and by inducing dyspnœa, owing to distension of the stomach.

I spoke of opium as a medicine which might be usefully given on the accession of the disease, and especially and mainly after a large bleeding. This period over, we ought to be very sparing in the use of opium, which may increase the pulmonary congestion, both by its effects on the circulation, and by dangerously weakening the innervation on the respiratory muscles, and on the lungs themselves through the par vagum. On the subsidence of the pulmonary inflammation and of the violent action of the heart, and the coming on often of nervous symptoms and wakefulness,—Dover's powder, in doses of three grains every two or three hours, will be of much service. When calomel is administered, this fashion of opiate may be usefully combined with it, even in an earlier period of the disease; and, as Dr. Stokes has already pointed out, the addition of a few drops of laudanum to the tartar emetic solution is both admissible and proper. You will find no contradiction between these admissions in favour of the occasional use of opium, and the general prohibitions precedingly laid down. Opium alone, after the first day, and in such doses as to produce its hypnotic effects, is prejudicial; but opium combined with calomel, or with tartar emetic, or even ipecacuanha, serves both as an adjuvant and corrigent, and aids the operation of these medicines without any inconvenient exhibition of its own more distinctive and peculiar powers. In cases of doubt, less objection applies to other narcotics, such as hyosciamus; and as a narcotic diuretic which directly soothes, and indirectly relieves also, by a revulsion on the kidneys, digitalis is entitled to consideration. Calomel and digitalis are most useful, particularly the former, in the pneumonia of children.

Sometimes sudden depression follows venesection, or comes on in the process of pneumonia, as I stated at the conclusion of my lecture before the last. This requires mild tonics and even stimulants. Of the latter I prefer, as prompter in its operation, and less

hurtful subsequently, carbonate of ammonia, to which small doses of Dover's powder and wine whey are properly added. In the cases in which we are forbidden to repeat venesection, and rely on the calomel, it is no bad practice to give, alternating with this latter, the carbonate of ammonia; and in some instances, where the expectoration and urine are scanty, small doses of oil of turpentine. In our recourse to tonics we shall be chiefly guided by the state of the stomach and the predominance of gastric debility. Of this class, calumba infusion, with a few drops of nitric acid, will be found to meet our wishes most satisfactorily.

The complication of hepatic disorder, or it may be inflammation with pneumonia, ought not to make any difference in the essential points of practice in the latter disease. Venesection cannot be postponed nor preferred in favour of emetics, and purgatives and mercurials which do not purge; but these remedies, and especially purgatives, will very properly follow bloodletting, and contribute not a little towards the cure. In those cases of *bilious* pneumonia, or, as these are generally designated with us, bilious pleurisy, whether there be pneumonia with pleurisy, pleuro-pneumonia, or pleurisy alone, preference should be given to calomel over tartar emetic after the lancet has been used. We give calomel at first to act on the bowels, aiding its operation in this way by saline purgatives, and afterwards as a direct antiphlogistic; a sedative, in fact, but not as a sialogogue. The presence of the menstrual flux has been supposed to contraindicate bloodletting in pneumonia; but without reason, if the symptoms are violent, and the case is of such a nature that it would otherwise call at once for venesection.

In the pneumonia of children we have at first difficulty in establishing a correct diagnosis, latent as the disease is so apt to be in this class of subjects; and, afterwards, a difficulty in carrying out and adopting our views of practice, in reference to their peculiar constitution. Bloodletting is required in infantile pneumonia, but not to the extent nor with the same freedom of repetition as in the case of adults. Could we, with Dr. Gerhard (*Am. Jour. of Med. Sciences*, vol. xv.), in his valuable paper on the pneumonia of children, suppose that this disease, in subjects from two to five years of age, approaches more to sanguineous congestion from mechanical obstacle to the circulation, than to inflammation, we should feel the less inclined to bleed, and would trust more to revulsion and counter-irritation. But as MM. Rilliet and Barthez pertinently ask (*A Treatise on the Pneumonia of Children* — Translated by Dr. Parkman of Boston): A rapid progress, formidable symptoms of reaction, evident traces of an inflammation of the lung or its dependencies — are not these sufficient to characterise an inflammatory affection? Whatever shade of pathological opinion on this point we may adopt, the fact is not the less clear that children do not in general require nor bear very copious abstraction of blood. Nutritive life is active in them; and there is great mobility both of the circulatory and nervous system; but their powers of reaction

are not great. We are restrained, also, by another consideration in the disease before us. It is seldom idiopathic; but results from other diseases and ailments, among which bronchitis is one of the principal. Thus gradual in its approach and complicated with other diseases, the pneumonia is not of that open kind that would justify large and repeated bloodletting. The experience of MM. Rilliet and Barthez, and the recorded testimony of other writers which they adduce, are unfavourable to the remedy, which, as they allege, exerts little or no immediate salutary impression, and displays no influence in shortening the duration of the disease. More may be expected from the application of leeches under the clavicles, or cups on each side of the chest, or between the shoulders, than from venesection; for unless we produce a stronger effect on the disease than it is in our power to do by the common expectorants, we shall almost certainly lose our patients. Respecting the value of the tartar emetic treatment in the pneumonia of children, my own experience coincides with the conclusions of the French writers just named, viz., "that the tartar emetic may be employed with success in the child; that there is no danger in a somewhat elevated dose; that the tolerance is generally easily established; that the gastro-intestinal accidents give little cause of fear; and finally, that this medicament appears to act more directly upon the pulse and respiration than upon the hepatisation itself." A remark made by MM. Rilliet and Barthez will not a little diminish our faith in the therapeutic powers of even the most approved remedies in this disease. It is; that the first signs of amelioration appear in nearly all cases at the same period of the disease, from the seventh to the ninth day, whatever may have been the treatment employed.

The *regimen* in ordinary pneumonia ought to be strictly antiphlogistic throughout; and hence a restriction to simple drinks, demulcent and diluent. Warm drinks are those generally recommended; but unless there be some gastric complication forbidding their use, cold ones are not inadmissible. If the counterstimulant plan be adopted, the patient should not be allowed to drink much liquid until toleration to the tartar emetic be established.

An exception to the antiphlogistic course in pneumonia is sometimes met with, in the cases of old and intemperate persons, to whom, in some instances, wine and even spirits has been allowed. The safer practice will be to give volatile alkali (carbonate of ammonia) in union with opium; and if farther stimulus be required to sustain the sinking powers of life, wine whey in small quantities at short intervals will answer every purpose.

The temperature of the room should be attended to, in connexion with the other parts of the treatment of pneumonia. Hot air and currents of cold air are alike injurious: an average temperature of 60° F. will be the best, but this is to be understood of the air for breathing, and not that to which the skin can be exposed in an uncovered state. I have no doubt of the good effects of occasionally allowing the patient to breathe cold air admitted by

opening the windows; provided there be no current blowing across or over him, and also that his whole body, even his face, with the exception of his mouth and nostrils, be carefully and warmly covered at the time.

Posture is of great moment in pneumonia; so that the chest should be raised above the level of the lower part of the body. The best means of doing this is by a bed-chair with a notched rack, which will allow of its being raised to any required angle. Muscular exertion of all kinds, including that in talking, is injurious, and must, except for the necessary acts of defecation, &c., be prohibited.

Convalescence. — Remembering the tendency to tuberculous disease of the lungs in consequence of pneumonia, we must watch with peculiar care the state of the pulse and the breathing, and ascertain the state of the lungs by auscultation, so as to be prompt and decided in case of any remains of crepitation, to keep the patient on a restricted regimen, and even to have recourse to leeches and cups, if local or partial (lobular) inflammation remains.

Sometimes convalescence may be retarded by a passive œdema of the lungs, as it is termed by M. Andral, which follows inflammation. Tonics are useful in this state; the diagnosis of which is not clear, or rather it must be reached empirically by watching the effects of treatment; for, as we learn from the same high authority just named, dyspnœa and the crepitating rhonchus, to which this form of the disease gives rise, are not sufficient to enlighten us.

We are apt to be misled both during the progress of pneumonia and of many other phlegmasiæ, by a persistent fulness and tension, or at least vibration of the pulse, which is due to hypertrophy, or sometimes temporary irritation of the left ventricle. A persistence in bloodletting and analogous depletion is not called for in such a case, or at any rate after the symptoms proper to pneumonia have disappeared. I have found tincture of digitalis in small doses, five drops, or vinous tincture of colchicum, twenty drops, twice a day, with a little sweet spirits of nitre, or cream of tartar in solution, to bring down the pulse, and at the same time meet the other exigencies of the case, should there be any remains of pulmonic congestion.

The means for preventing a relapse are the same as those which are prophylactic against pneumonia. They will consist in a careful protection of the skin by suitably warm and, what is best for this purpose, flannel and woollen clothing: nor will these be of much avail unless the chest and the shoulders up to the neck be kept uniformly covered, and the feet be protected by thick and warm shoes from cold and dampness. The neglect of a plain principle of hygiene in this respect will explain in a great degree why women and children are such sufferers from pulmonic disease. It is bad enough for mothers to be such slaves of absurd fashion in their own persons, as to expose their shoulders to the cold in the way in which they commonly do; but it is positive cruelty, whose only

excuse is gross ignorance, to subject their infants and other children to similar exposures.

Treatment of Typhoid Pneumonia (by Dr. Stokes). — We may enumerate the principal points of difference between the treatment of the typhoid and that of the preceding variety: they are as follows:—

1st. That general bloodletting is to be used with extreme caution.

2d. That the mercurial is in general to be substituted for the antimonial treatment.

3d. That counter-irritation may be employed at an earlier period.

4th. That the vital forces are to be carefully supported.

5th. That as gastro-intestinal disease frequently complicates the pneumonia, close attention must be paid to the abdominal viscera.

6th. That stimulants are to be used with greater boldness and at an earlier period.

In this disease the use of the lancet is often inadmissible; I have frequently seen patients faint after the loss of four or five ounces of blood, and this has occurred without any beneficial effect on the disease. In a few cases, where the disease has occurred in the young and otherwise robust individual, I have employed the lancet with caution, but in the feebler constitution its employment seems to be both hazardous and unnecessary. Local bleeding, however, particularly with cupping-glasses, is always beneficial, and may be again and again repeated while the patient is using wine and other stimulants. Blisters should be used from an early period, and while these means are being employed, the system is, if possible, to be brought under the influence of mercury; the patient should be in general swathed in flannel, and the warmth of his extremities carefully supported.

But in many cases we must attend to the abdominal complication; and it is often advisable to apply leeches to the epigastric or ileo-cœcal regions, to use poultices to the belly, emollient or anodyne injections, and, in short, to put the usual treatment of gastro-enteritis into full effect. In this affection great caution must be observed in the use of purgative medicines; and should the internal exhibition of mercury induce diarrhœa, it is to be omitted, and inunction substituted.

The remedies which I have found to answer best in the advanced stage of the disease, where the patient becomes hectic with a copious expectoration, are the decoction of senega with carbonate of ammonia, and the different preparations of bark. Of these the first has in general answered best. In this condition, however, it would be always advisable that the patient should change his air.

I cannot agree (says Dr. Stokes in conclusion) with M. Louis in his opinion as to blisters, though I admit they are often unsuccessfully and injuriously employed; but when a pneumonia has supervened on a chronic catarrh, in the sthenic form, when the inflammatory symptoms have been removed, and in all cases of the typhoid affection, blistering, when properly conducted, has the happiest effects.

Chronic Pneumonia. — Considered as an original affection, there can be no doubt, says Dr. Stokes, whose account of the disease is here adopted, that simple chronic pneumonia is a rare disease; but it is difficult to define the exact meaning of the term *chronic pneumonia*, or to draw the line of distinction between it and that low irritation of the lung which is followed by the tubercular infiltration. It seems not unlikely that there are two forms of the disease: the one producing the iron-grey and indurated lung; and the other forming, or ultimately passing into, tubercular solidity. The first we may call the simple chronic, and the second the scrofulous pneumonia; and, perhaps, many cases of the senile phthisis may be referred to the second variety.

These forms of disease differ remarkably in their liability to produce suppuration. In the scrofulous affection, suppuration, though slow in its occurrence, is almost sure to supervene; while in the simple form abscess is seldom observed, the termination being in that hard and semi-cartilaginous condition—the "*induration gris*" of Andral.

In two cases, however, I have seen a chronic abscess of the lung, without any evidence of a tubercular condition; to this I have already alluded.

We must agree with Dr. Forbes, that although the essentially chronic inflammation of the lung is extremely rare, its occurrence as a sequel of the acute disease imperfectly resolved, or as complicating other lesions, is by no means uncommon.

On these subjects you may consult the works of Laennec, Broussais, Chomel, Andral, Louis, and Forbes.

Physical Signs of Chronic Pneumonia. — These signs, though essentially the same as in the acute disease, yet differ from them principally in the greater slowness of their changes, and in the absence of the phenomena of local excitation, whether physical or vital.

But it is in the occurrence of atrophy of the lung, and the consequent contraction of the chest, that the peculiarity of the signs of this disease is seen. It will not, however, be necessary to repeat what I have already said when describing the physical signs of pneumonia.

To this brief notice of chronic pneumonia made by Dr. Stokes, I must add a caution against your having recourse with any freedom, if at all, to direct depletion, or bloodletting. Kept up as the disease is by and at any rate often associated with phthisis pulmonalis, we ought to avoid all the means which would reduce the system, and particularly those which interfere with nutrition; as they must contribute to a more rapid development of tuberculous disease. The treatment, therefore, in consonance with this view, will consist of alteratives of the narcotic class, with mild tonics, gentle aperients, and counter-irritants to the skin, together with an adherence to the hygienic rules inculcated for the prevention of acute pneumonia. This latter has a tendency to become chronic in young children.—*Gerhard* (*op. cit.*).

LECTURE LXX.

DR. BELL.

PLEURISY — PLEURITIS.— Its forms and complications —*Chief symptoms*—Fever, pain, difficult breathing, hard and frequent pulse, and decubitus on the back—Even the chief symptoms not always present; and they may be present without pleurisy—Structure of the pleura—*Anatomical lesions*—Change in the pleura itself,—in its secretion; immediate effects of this latter—Quality and changes of secreted matters—false membranes,—their characters—tubercles and cancerous bodies—Change in the secretion and state of the lung by the effusion—*Causes*—Identical almost with those of pneumonia—Cleghorn's description of *bilious pleurisy*—*Physical signs*;—altered conformation of the thorax, dulness on percussion,—resonance of voice in auscultation,—œgophony;—friction sounds.—Dr. Stokes's description of dry pleurisy—Diminished vibration of the parietes of the thorax—*General symptoms*—Fever, state of pulse, buffy and cupped blood—*Progress, duration, and termination* of pleurisy—*Varieties—Complications—Prognosis—Typhoid Pleuritis.*

PLEURISY — PLEURITIS (πλευρίτις from πλευρα, the side; also the membrane that lines the ribs, the *pleura*).

Pleurisy signifies inflammation of the serous membrane which lines the cavity of the chest, and invests the contained organs of respiration. The forms under which pleurisy presents are various and considerable. It may be acute or chronic; it may affect one side of the chest or both sides; it may be general, involving the whole of one side; or partial, only part of one side; it may be simple or complicated: the complications may be either accidental or essential, and in the latter case the pleurisy and its complication stand to each other in the relation of effect and cause.

The chief *symptoms* of pleurisy are, fever after a chill, with pain in the side, which is usually acute, pungent, and lancinating, as if a sharp instrument were driven into the side whenever the patient inspires. With these are associated difficulty of breathing, which is quick, short, and as if jerking; dry cough, hard and frequent pulse, flushed face, and most generally decubitus on the back or the affected side.

A few remarks will be in place on each of these leading symptoms; and first on the pain. Commonly pain exists from the very beginning of the disease, but it is often wandering until after the first or second day, when it becomes fixed and permanent, and also circumscribed in one spot. Its seat is on a level with or just below one of the mammæ at the part corresponding with the lateral attachments of the diaphragm; and it is thus fixed even when the inflammation pervades a much greater space, perhaps the whole of the pleura. Occasionally it is felt in the shoulders; in the hollow of the axilla, beneath the clavicle; along the sternum, and sometimes over the whole of one side of the thorax; or on a line corresponding with the borders of the false ribs, or of either hypochondrium, in the epigastrium, or even in the lumbar region. In most cases the pain, after having been very acute during the first period of the disease, diminishes in violence, becomes obtuse, and may cease

entirely, even before the termination of the disease. Sometimes, after having thus ceased, it returns with intensity, indicating a renewal of the inflammation.

But we may have the symptoms enumerated, and pain, also, which is one of the most constant features of pleurisy, without this disease being actually present. Sharp pains of a nervous, and still oftener of a rheumatic character, closely imitate those of pleurisy; and if they happen to be attended with feverish excitement the resemblance is perfect. On the other hand, even exalted sensibility of the pleura itself is not by any means a necessary accompaniment to its inflammation; and there are cases in which there had been scarcely a suspicion of disease in the chest, and yet acute inflammation and its concomitant, copious effusion, had been for many days or weeks occupying the pleura. The symptoms of oppressed breathing, proceeding from the pressure of the effusion, will be distinct only when the effusion has accumulated very rapidly. In this cause of embarrassment we seek to be enlightened, and generally with success, by the physical signs.

The *breathing* is commonly hurried in pleurisy. If there is no effusion this labour of respiration must proceed from the pain being opposed to the free contraction of the muscles which dilate the thorax. Effusion being present, the dyspnœa is generally proportionate to the quantity of the effused fluid. But even to this state of things there are marked exceptions; some persons, as we learn from Andral, with effusions, not only talk readily, but are able to walk about and perform journeys without any inconvenience on the score of respiration. The modifications in the respiratory act will depend mainly on the portion of the pleura inflamed; in costo-pulmonary pleuritis the breathing is chiefly diaphragmatic; while in inflammation attacking the pleura which lines the diaphragm, the thorax is chiefly dilated by the intercostal muscles.

The *cough* characteristic of pleurisy is short, catching, as it were, dry, or accompanied with a thin mucous expectoration. The cough is not in this disease, any more than in pneumonia, in frequency or force, proportionate to either the intensity or extent of the inflammation. Should the sputa assume more consistence and other different appearances, we may suspect complication, as of pneumonia and bronchitis, or, a rare case, the opening of the pleuritic effusion into the bronchia.

Nothing very positive can be inferred from the *decubitus*, which varies in different cases; for although in some the patient lying on his back with a slight inclination to one side, or lying on one side, may lead to a suspicion of effusion in this side; yet in a large majority of cases we find, as M. Andral has observed, that, whether there be effusion or not, the decubitus is on the back.

Before I speak of the physical signs and the anatomical lesions in pleurisy, it is fitting that I should direct your attention to the *pleura*. The pleura consists of two layers; one distinctly serous, which is always bedewed with a serous fluid, lines the cavity of the

chest, and forms the outer covering of its organs. The other is clearly fibrous in the costal pleura, and, together with that of the pericardium, seems to be a continuation of the deep-seated cervical fascia. Dr. Stokes has succeeded, after rémoving the serous coat and a part of the adherent sub-cellular tissue investing the lungs, in demonstrating the transparent though strong fibrous coat beneath. This is in direct apposition with and invests the whole of both lungs, covers a portion of the great vessels, and the pericardium seems to be but its continuation, endowed in that particular situation with a still greater degree of strength for purposes sufficiently obvious. "It covers the diaphragm, where it is more opaque, and, in connection with the pleura, lines the ribs, and, turning, forms the mediastina, which thus are shown to consist of four layers—two serous, and two fibrous.

"This description of the investments of the lung is interesting, in a physiological and pathological as well as an anatomical point of view. It establishes an additional analogy between the lung and the parenchymatous and glandular organs of the abdomen, which have their fibrous capsules, and illustrates the general law of the constant association of serous and fibrous membrane, as we see to occur with respect to the arachnoid, pericardium, peritoneum, tunica vaginalis testis, and the synovial capsules. Considered pathologically, it may explain the pain of pleurodyne and pleuritis, and the rarity of perforations of the pleura, so remarkable when considered in connection with the frequency of ulcerations of the lung, which constantly approach so close to the surface as to be bounded by the fibro-serous membrane alone. In pleuritis, with effusion, its existence may assist in explaining the binding down of the lung, and its corrugated appearance after the removal of the effusion; and, as has been suggested to me, it may be the seat of ossifications of the pleura.

"But notwithstanding this structure of the pulmonary tunics, we find that the pleural cavities are capable of great dilatation, and that the mediastinum is not that resisting septum which it has been supposed. On the contrary, we find it to yield rapidly to the pressure of intra-thoracic accumulations, and I have repeatedly observed this to occur long before any yielding of the muscular parietes. Hence it is that, in empyema of the left side, displacement of the heart occurs long before the intercostal spaces are obliterated, or the diaphragm depressed; and that in a case of dilatation of the cells, as I have already shown, an attack of bronchitis causes the morbid clearness to extend beyond the median line. It is not improbable, however, that the strength of the fibrous tissues varies in different individuals; indeed, with respect to the pericardium, the greatest difference of strength exists, for in some subjects we find it dense and opaque, while in others it is nearly transparent. The greater or less extensibility of the pericardium may influence the phenomena which result from sudden effusions into the sac, as in cases of rupture of the heart or aorta." In a case of the

latter description, with sudden death, Dr. Stokes found the pericardium, which had not been previously distended, containing upwards of a pound of blood.

The pleura is sussceptible of inflammation of the adhesive kind, which is accompanied merely by pain; and by the pouring out of serum, coagulable lymph, pus, or blood.

Anatomical Lesions. —Pleurisy gives rise to textural alterations of the pleura, to alterations in its secreting function, and to modifications in the condition of the lungs, such as compression, displacement, changes of volume, of situation, and connexions.

The pleura seems to be reddened in pleurisy, but this redness is owing to the injection of varying intensity in the sub-serous cellular tissue. If the pleurisy be slight, the membrane itself preserves its transparency, and exhibits no marks of vascular ramification. Inflammation of a more intense kind, continues M. Andral (*Pathologie Interne*), gives rise to a vascular plexus in the serous membrane, filled with blood, and of more or less closeness and distinctness; sometimes dotted, at other times striated, or in laminæ in sinuous bands; or, a rare occurrence, the whole diseased surface is of a uniform red hue. Whatever may be the colour, or opacity, or transparence of the pleura, it is seldom thickened, softened, or ulcerated.

The changes of secretion are more numerous and diversified than all its other abnormal peculiarities. According as the secreted matter is air, or chiefly serosity or purulent fluid, it is called *pneumothorax*, *hydrothorax*, and *empyema*. As regards *quantity*, this may vary from an ounce to several pints. In the latter case, the lung is protruded from its place, and occupies less room than common; the diaphragm is pressed downwards, and causes a prominence outwards of the liver to the right and the spleen to the left: the ribs are more widely separated than in health, and the intercostal spaces more prominent; the skin of this side is also preternaturally smooth. The mediastinum is pushed to the side opposite that of the effusion; and when the effusion takes place in the left side, the heart may be pushed to the right, and its apex at the same time brought so near the sternum that its pulsations thenceforward are only heard behind the bone and in the right side of the thorax. The protrusion of the intercostal spaces and diaphragm results from a paralysed state of these expansions — in the opinion of Dr. Stokes. Effusion may take place in a few hours (*Hodgkin — Morbid Anatomy of the Serous Membranes*).

The *quality* of the pleuritic secretion is various; sometimes colourless, or of a citron hue, limpid, and transparent; at times, in the midst of this limpid serosity float some albuminous flocculi; or these are partly dissolved in the serosity and impair its transparency. In some cases the fluid is turbid, or green, or yellowish-brown, or ash-coloured; sometimes thick, and, as it were, muddy. In other cases the secretion is truly purulent; or resembling on occasions half liquified animal jelly; and it may even consist of blood.

These liquid products of secretion from the pleura become concrete in part, and pass into a solid state; and in this way *false membranes* are formed, varying, as regards organisation, in their figure, colour, extent, consistence, and thickness. The more immediate material for this membranous formation is coagulable lymph. This is at first soft, of a grayish-white colour, something like paste. It soon acquires an increase of consistence, puts on an albuminous appearance, and is gradually organised. Red points show themselves, few in number at first, but after a while increasing, and gradually running into lengthened lines or streaks along the surface of the effused matter. These streaks soon become distinctly vascular, and the newly formed vessels inosculate with those of the pleura. The adhesions thus made are of very different forms and sizes; being sometimes merely miliary granulations, separated from each other; at other times large concretions, of a cellular texture, and uniting the two surfaces of the pleura by various bands. The thickness of the newly formed membrane is sometimes no greater than that of the pleura itself; but more commonly it exceeds this latter: the thickness of the new formation is made, however, of several laminæ resting one upon another. Sometimes these false membranes are formed after a few days sickness; and, again, not after a period of three weeks from the invasion of the disease. As a general rule, it may be said, that coagulable or plastic lymph and early adhesion are most to be expected in young, strong, and healthy persons; while curdy and unorganised lymph, or granular deposits with permanent serous effusions, are met with in the old, the feeble, and the scrofulous.

These false membranes may pass into a fibrous, cartilaginous, or even osseous tissue.

Tubercles are not unfrequently met with in the inflamed pleura: in the midst of the false membrane they are quite numerous, and are evolved with great rapidity. Twice M. Andral has seen the pleura seized with cancerous bodies of considerable size.

The lung which is displaced and compressed by the effusion is reduced sometimes to a very small size; and when covered with false membranes we might suppose that it had been entirely destroyed. On occasions, it is only a lobe that is thus displaced; and the lung itself may sometimes be pushed towards the side of the thorax backwards or laterally, in place of on the vertebral column. It is never found to crepitate: it is denser than natural, and sinks when put in water. We sometimes meet with pleuritic effusion and inflammation of the pulmonary parenchyma at the same time.

The *causes* of pleurisy are identical for the most part with those of pneumonia; and particularly those which produce a sudden chill and stoppage of perspiration, such as atmospherical vicissitudes, cold drinks in the stomach, or the sudden application of cold to the surface of the body. Organic lesions of the lungs, as pneumonia and tuberculous disease, are frequent causes of pleurisy. But while pneumonia readily produces pleurisy, this latter is not so apt to produce pneumonia. A rupture of the pulmonary vesicles which esta-

blishes a communication between the cavity of the pleura and bronchia sometimes causes partial pleurisy. A particular distemperature of the air will give rise to epidemic pleurisy, which generally is of a more asthenic nature than isolated or sporadic cases are. Sometimes the digestive apparatus is much more deranged at the same time, and then we have that which has been denominated *bilious pleurisy.* The disease described by Cleghorn (*Diseases of Minorca*) was most probably of this nature, unless we class it under the head of bilious pneumonia.

"Those pleurisies began commonly like an ague fit, with shivering and shaking, flying pains all over the body, bilious vomitings and purgings, which were soon succeeded by quick breathing, immoderate thirst, inward heat, headache, and other feverish symptoms. In a few hours the respiration became more difficult and laborious; the most part of the sick being seized with stitches in their sides, striking upwards to the clavicle and shoulder blade; obliquely downwards along the cartilages of the bastard ribs; or else darting across from the breast-bone to the vertebræ of the back; so that they could neither cough nor make a full inspiration without great pain. Many complained chiefly of a load and oppression in their breast, as if a millstone had been laid upon it; some of a heaviness and fluttering about the heart, which at one time seemed to glow with extraordinary heat, at another to be chilled with cold, as if it had been dipt in ice-water. In a few of the sick those complaints preceded the fever, in others they did not come on till the day after.

"In the progress of the disease it was not uncommon for the pains to move about in the thorax from one place to another. Sometimes they would shift from the breast to the limbs, and of a sudden return to the bowels; and I have seen cases wherein, after leaving one side, they have attacked the other unexpectedly, and proved fatal in a very short time. The left side of the thorax was not near so liable to be affected as the other; forty-two out of sixty patients who were seized about the same time having had the disease in the right. But whichsoever side was affected, the sick lay easiest on the opposite; though the generality were obliged to lie upon their backs, or to sit up in bed with their heads erect. Many were drowsy and inclinable to sleep; but they raved at intervals, or were much disturbed with extravagant dreams. Some laughed in their sleep; others would awake in a fright and start out of bed, imagining that the house was in flames; and that those about them were endeavouring to push them over a precipice; to pierce their sides with daggers; to bind them down with cords, or iron hoops, and things of the like nature."

Physical Signs. — First among these, as the sign which more obviously meets the eye of the physician, is the altered conformation of the thorax. The side in which effusion has taken place is full and more prominent than the opposite one; but as we may be deceived in this particular, by merely looking at the chest, we ought, in order to prevent mistakes, to take the measure of the two sides, by

means of a ribbon, one end of which is to be held in a spinous process of the dorsal column and the other brought to the middle of the sternum. Dr. Stokes employs a pair of broad steel callipers, with a graduated arc, for the purpose. The enlargement on the diseased side is seldom more than an inch and a half. The ribs and cartilages preserve their relative position, as they would during a very full inspiration; the intercostal spaces are increased, protruded beyond the ribs, and allow of a fluctuation being felt within. But there may be considerable effusion without external dilatation,—the space for the fluid in the chest being made at the expense of the lung, which is excessively compressed and reduced to an embryo size and character, and as such is impermeable to air.

When, on the other hand, the effusion is absorbed, and the lung is prevented by any cause from resuming its former expansion, the side which was before morbidly dilated is now smaller than natural, and contracted.

Percussion indicates the presence of an effusion, however slight, in the thoracic cavity, by a diminished resonance on the side diseased. At first the dulness of sound is heard only at the lower part; but afterwards over the whole of the affected side, from the subspinous fossa of the scapula and the clavicle to the base of the thorax. In cases of double effusion the proper resonance of the chest is diminished or lost on both sides; and under such circumstances, as there are no contrasted sounds between the two sides, especially if the effusion be inconsiderable, percussion may seem to indicate only a physiological state. When the effusion is circumscribed within narrow limits, the dulness is only at one spot, and at other times it is not perceptible at all. It may happen again that, owing to the pain being so acute, percussion cannot be practised.

The signs furnished by *auscultation* in pleurisy are generally of the most satisfactory kind, as regards the aid which they give us in forming our diagnosis. At the outset of the disease, when the pain is still very acute, but before effusion takes place, we discover, either by the ear applied to the chest or through the medium of the stethoscope, that the customary respiratory or vesicular murmur is less than common. This depends on the patient's instinctively dilating his chest less, and of course expanding less his lungs also, owing to the violence of the pain. So soon as the effusion takes place, the respiratory sound is heard less distinctly than on the affected side; and in proportion as the effusion increases, the respiratory murmur becomes more and more feeble, while on the other side it acquires unusual force. If the effusion is very great, the respiratory sound is lost entirely in every part of the chest. In most cases, the lung being protruded towards the spinal column, the respiratory sound ceases progressively from below upwards, both behind and in front. A different direction given to the lung by the effused fluid, as where it is drawn against the walls of the thorax, will cause an extinction of the sound in front, but allow of its being still heard, but feebly, behind.

When the effusion which extinguishes the respiratory murmur is considerable, it sometimes happens that no other sound takes its place; but, at other times, it is replaced by bronchial respiration.

The resonance of the voice is singularly modified in those persons whose chests are the seat of pleuritic effusion. The ear applied to the chest on the diseased side, at this time, is sensible of a quality of voice which resembles the bleating of a goat, and which, for this reason, has been called by Laennec œgophony. Often, in place of this bleating, it is a quivering, thrilling, cracked, and discordant sound, resembling the voice of Punch; an apt comparison, for whoever has heard this distinguished character, and whoever has not, will hear it in perfection, be it said parenthetically, on the Mole at Naples. At other times, it seems as if the voice passed through a tube, or it is muffled, and the articulation of each word seems to be in a peculiar whisper. In many cases these various slides of œgophony are only heard at intervals, and are only perceptible in the enunciation of certain words; even of a monosyllable, as of *we*, which will serve to illustrate the case referred to by Andral, who only detected this sound when his patient uttered the word *oui*. Œgophony is not heard when the effusion is inconsiderable; and it ceases after the effusion becomes very great. There are other sounds discovered by M. Reynaud, and further explained by Dr. Stokes, which indicate a moderate degree of lymphatic effusion. They are called the friction sounds, and are represented to be characteristic of *dry pleurisy*. But on this subject Dr. Stokes shall speak for himself.

Dry Pleuritis — Friction Sounds. — "This term has been given to that form in which nothing is effused but lymph. The characters of the case may in general be stated to be, that the constitutional and local distress is comparatively slight, that organisation rapidly advances, that the sound is clear on percussion, — the phenomena of accumulation or displacement wanting, and the friction signs evident.

"We meet with dry pleurisy under various circumstances. It may occur as an uncomplicated and original disease, or as secondary to a general morbid state, such as fever, erysipelas, or the diffuse inflammation; it may be combined with, or succeed to any of the affections of the lung, or occur as a complication of cardiac or hepatic disease.

"The *physical conditions* of dry pleurisy, however, may be met with in two stages of the ordinary disease, namely, in the earliest periods before effusion takes place, and in the latter stages when the liquid effusion is absorbed. In the first case the duration of the friction phenomena depends on the rapidity of effusion; in the second, on the vigour of the constitution which influences the process of organisation.

"The characters of this friction sound are various, but in all instances it conveys the idea of two rough and dry surfaces moving with an interrupted motion upon each other. It accompanies the

inspiration and expiration, and may be absent during ordinary breathing, but become manifest on a forced expansion of the lung. In the early period of the disease pain is often felt in the situation corresponding to the phenomenon; but this soon disappears. In many instances the rubbing sensation is perceptible to the patient for a length of time, but we may repeatedly observe the sound to continue long after the patient ceases to perceive the obstruction.

"The sound in the early stages of the simple disease, or immediately after the absorption of an empyema, is frequently accompanied by the rubbing sensation, perceptible to the hand. Like the former sign, this may be absent during ordinary breathing, but become manifest when the patient inspires deeply. In the progress towards cure, this is the first of the physical signs to subside; it is obviously connected with the most unorganised condition of the effused lymph.

"Although these phenomena are precisely analogous with those of the dry pericarditis, their characters are not so variable as in that affection, nor are they so speedily and curiously modified by treatment. The organisation of lymph seems to advance much more rapidly in the pericardium than the pleura. The sound, however, is susceptible of certain modifications: thus, in a case of absorbed empyema in a very emaciated subject, the friction sound, which existed extensively over the side, was similar to that produced by the rubbing of a wet finger on a tambourine; it was so loud as to be audible for more than a foot from the patient's chest, particularly when he sneezed, coughed, or laughed. A case has been already mentioned in which the friction phenomena existing both in the pleura and pericardium were of a distinctly metallic character, in consequence of the distension of the stomach and colon with air. (*Researches on the Diagnosis of Pericarditis*, Dublin Medical Journal, vol. iv.) The creaking sound, *bruit de cuir neuf*, is rare in pleurisy: I have only observed it in two instances; in both an effusion had been absorbed, but the phenomenon was by no means so characteristic as that in inflammation of the heart or peritoneum.

"Until very lately, I had believed and taught that the friction sounds were always accompanied by clearness on percussion, or with a slightly diminished resonance, — pulmonary expansion, pure or mixed with *râles*, being always audible. But I have lately witnessed a case of empyema, in which, although great and universal dulness of the side existed, the phenomena were audible, and even perceptible to the patient in the postero-inferior and lateral portion of the chest. They may, then, coexist with extensive liquid effusion. This, however, must be considered as an exception to the general rule, that after the absorption of an empyema the friction sound coincides with clearness on percussion.

"The duration of the friction phenomena, depending on the absorption of the liquid and the rapidity of organisation, varies remarkably in different individuals: it is comparatively short in the

young and robust; while in the feeble and cachectic the phenomena may continue without changing for upwards of a month; thus, in a case of phthisis senilis, the friction sound continued for upwards of five weeks audible from the third to the seventh rib. When, however, it succeeds to the absorption of an effusion, it may continue for a period varying from three days to as many weeks. In one case the phenomena continued unabated for this space of time, but on the patient being sent to the country, it at once subsided. The organisation went on rapidly on the improvement of the vital force.

"As might be expected the friction sound is generally more audible over the central than either the upper or lower portions of the chest. I have never found it in the acromial or supra-spinous regions, but have observed it immediately below the clavicle. The case was one of aneurism of the innominata, with pleuritis of the upper portion: dissection verified the diagnosis. In a case of empyema, in progress of absorption, the friction phenomena existed posteriorly down to the very lowest boundary of the thorax.

"The rarity of these signs in the upper portion is explicable by the less degree of motion of the pulmonary on the costal pleura.

"When describing the phenomena of dilatation of the air-cells, I alluded to Laennec's opinion, that the murmur of ascent and descent proceeded from the friction of sub-pleural vesicles, and stated my reasons for agreeing with Meriadec Laennec in his dissent from this opinion; and, without denying the possibility of its occurrence, I must observe that I never met with it in any case of Laennec's emphysema, and that in the instance recorded by Reynaud, in which the friction signs coincided with an emphysematous state of the lower lobe, in a phthisical patient, the facts are far from conclusive.

"The rarity of the friction phenomena in pneumonia has been already noticed. In no case have I found them after hepatisation had formed; and their coexistence with the crepitating *râle* in the early stages is extremely rare."

M. Reynaud points out another easily recognised sign of pleuritic effusion. It is the absence of vibrations of the parietes of the thorax, when the hand is placed on it, during the time in which the patient speaks. In a case in which pneumonia coexisted with pleuritic effusion, and in which, generally, the symptoms indicating parenchymatous inflammation are generally wanting, one of these, *crepitation*, may be removed by causing the patient to lie on his face. At this time, also, the œgophony becomes bronchophony.

General Symptoms. — For the most part pleurisy is accompanied by fever. In the first or acute stage, the skin is hot, and pulse is hard and frequent; indeed a tense pulse is one of the most characteristic symptoms of the disease. In a more advanced period, either from an abatement of the inflammation, or by the passage of the disease into a chronic state, the skin loses its heat, but the pulse retains its frequency with less resistance. Profuse sweating only comes on when tubercles are developed either in the pleura itself, or in the

false membranes formed on it. When pleurisy becomes decidedly chronic, the pulse loses all its frequency, at the same time that the breathing becomes free and regular. Not, as M. Andral remarks, that the disease is cured, for the effusion still exists, as is proved both by percussion and auscultation; but the circumstances are favourable for a cure; showing, he adds, that the ancients were in error in supposing that fever was necessary to the resolution of chronic diseases.

The blood taken from a vein, in pleurisy, is cupped, and almost always exhibits on cooling a coagulum covered with a thick buffy coat. Unless in cases of complication, such as bilious pleurisy, the digestive organs are not disordered. As happens in other phlegmasiæ of the serous membranes, the secretion of urine is diminished, and deviates from its natural properties. Nutrition is profoundly affected; chronic pleurisy with effusion giving rise almost always to marasmus.

M. Andral, to whose admirable descriptions I am so largely indebted, in the disease now before us, as I was in pneumonia, sums up the leading features of the disease, in its different stages, under the head of *progress*, *duration*, and *termination*.

Pain, commonly seated beneath one or other of the mammæ, preceded or accompanied by fever, and a dry cough, dyspnœa, fever, and often a weaker than ordinary respiratory murmur on the side in which there is pain, are the first symptoms which indicate the invasion of pleurisy. If no effusion is formed, these disappear at the end of a few days, and the cure is complete. But if an effusion in the pleura is formed, the sound on percussion is dull and flat; the respiratory murmur, at first weak, ceases entirely, or is replaced by a bronchial breathing; different varieties of œgophony are heard, and the parietes of the chest on the affected side offers a more or less obvious dilatation. Death may be the result of this state of things in a short period; and it is more to be dreaded when the dyspnœa and fever are great. If these leading symptoms of pyrexia and laboured breathing are abated in violence, the disease is prolonged, and passes into a chronic state; in which case it may either end in death or restoration to health. Death is generally preceded by decay and marasmus, which are the consequence both of the imperfect hematosis, owing to the complete inertia of one of the lungs, and of the presence of inflammation with copious suppuration and the production of accidental tissues. In other cases death takes place in consequence of the sudden return of pleurisy in an acute form, which, supervening on the chronic, proves speedily fatal. Finally, death sometimes occurs as the result of an opening between the cavity of the pleura and the external air, either by perforation through the bronchial cells or the walls of the thorax. But even under these alarming circumstances there may be a favourable issue. Critical discharges sometimes announce the absorption of the effusion, such as metrorrhagia, copious sweats, or a bronchial flux.

The *varieties* of pleurisy proceed either from the symptoms or the seat of the disease. There are pleurisies with, as there are those without effusion, and unaccompanied by pain, cough, dyspnœa or accelerated pulse. There are others, again, that do not give rise to any dulness of sound, nor to any modifications of the respiratory murmur or of voice. Some, most, pleurisies are manifested by characteristic symptoms; some are latent. There are double or single, general or partial pleurisies. When the pleurisy is *interlobular*, nothing is revealed by either percussion or auscultation; although sometimes a collection of pus is found simulating pneumonic abscess. Dyspnœa may be evident, with slight pain; the fever is hectic, and death closes the scene. If the disease be *mediastinic*, the sound is dull on striking the sternum. When it is diaphragmatic the pain is no longer referred to the thorax; the breathing is purely costal; there is orthopnœa; the patient sits up in his bed, or leans forwards and presses on as if to support his hypochondria; the dulness is extreme, with hiccup, nausea, and sympathetic vomiting. If the pleurisy is on the right side there is jaundice, owing to transmitted irritation of the liver. This last form presents a very difficult diagnosis, since it simulates hepatitis, partial peritonitis, in the hepatic region, gastritis, and finally rheumatism of the diaphragm. I had occasion, when a student in Virginia, to watch a case of this nature, in which, with all the symptoms of pleurisy, there were jaundice and irritable stomach. The subject was a young man, a farmer, of robust and strong constitution, but somewhat addicted to drinking ardent spirits. He recovered under the antiphlogistic course, — venesection, purging with calomel and appropriate adjuncts, antimonials, and subsequently blisters.

The most frequent *complications* with pleurisy are pneumonia, pericarditis, and pneumothorax; and, but less seldom, bronchitis, and even peritonitis. Laennec describes three varieties of the complication of pneumonia with pleurisy. The first is the ordinary one of pneumonia with slight dry pleuritis. In the second, inflammation of the compressed lung may occur, producing that variety of hepatization which he has denominated carnification: while in the third, severe inflammatory action affects both the pleura and lung. This, says Dr. Stokes, is by far the rarest case.

Prognosis. — Pleurisy must always be regarded as a serious disease; the prognosis in which will vary, however, according to the nature and intensity of the causes, the extent of the pleuritic inflammation, and the presence or absence of effusion. Pleurisy induced by tuberculous irritation most always furnish a bad augury; so does double pleurisy, even before effusion has taken place. The gravity of the disease will be heightened by its being seated in the diaphragmatic portion of the pleura, and, still more, by the extent of the effusion: if double, and of any extent, it is generally fatal. An effusion of pus is more sinister than one of serum; but we have no evidence to show that blood effused gives rise to more alarming symptoms than either of the fluids just mentioned. The per-

sistence of the fever and dyspnœa is always bad; nor can we hope for absorption of the effused fluid until these two symptoms have been abated or have disappeared. Marasmus and profuse sweats must induce suspicion of tubercles in the inflamed pleura.

Typhoid Pleuritis (*Dr. Stokes*). — A very close analogy exists between this affection and the typhoid pneumonia. Like that disease, it occurs in the debilitated or broken-down habit; or is secondary to typhus fever, or some other morbid constitutional state. Pursuing the analogy, we find that it is generally latent, and often pointed out more by sinking of the powers of life than by any new suffering; that, though forming suddenly, it is slow to be removed; that it is seldom uncomplicated, but rather one of many secondary lesions; that it is frequently combined with gastro-enteric disease; and that it does not admit of active antiphlogistic treatment.

In the first part of this section I have enumerated the principal circumstances under which we meet with typhoid pleuritis.

As a complication of essential typhus, this disease is rare. Louis (*Recherches sur la Maladie connue sous les Noms de Gastro-Enterite*, etc., tom. ii. Paris, 1829,) found, out of fifty-seven cases, but one in which it occurred. I have seen but two well-marked examples of it. In both, the disease set in during a severe typhus, and was pointed out by sudden and unaccountable sinking. In the first case, the effusion occurred on the sixth day, and occupied a large portion of the left pleura; no pain or distress of breathing accompanied the disease. The patient recovered from the fever, and the effusion was subsequently absorbed; his pulse, however, remained quick; cough appeared; and phthisis was apprehended. He was carried off by a sudden attack of encephalitis; and, on dissection, the lungs were found to contain miliary tubercle, while the left pleura was obliterated.

In the second case, on the fourteenth day of a severe maculated fever, a sudden sinking was observed, and frottement discovered over the left side. On the next day, the patient, a young female, had the appearance of an individual in cholera; she had sweated copiously, and was covered with miliary eruption; there was severe orthopnœa, and she speedily sank. A double effusion had existed. The left pleura contained a large quantity of whey-coloured fluid; while in the right, the effusion was more sanguinolent and serous. In both, lymph occurred in a reticulated form over the whole serous membrane; and also in the pericardium.

Similar circumstances occur in puerperal fever. Dr. Lee mentions three cases in which the symptoms, during life, were exceedingly obscure, yet where copious effusions occurred, and the pleura was covered with false membranes. In one, the pleura had given way by sloughing (Cyclopedia of Practical Medicine, article *Puerperal Fever*). Similar appearances have been observed by other authors.

But it is in these morbid states of the system, which may be denominated the pyogenic conditions, that we observe this disease

most frequently. It is common in the erysipelatous diseases, particularly of the low type; in purulent phlebitis, and in the diffuse inflammation. In these cases, purulent collections are commonly found in the pleura, although, during life, symptoms of pleurisy were either absent or very slightly marked. In a few instances, however, I have observed the invasion of the disease to be accompanied by severe pain.

There is an affection which may be termed typhoid arthritis, in which this secondary pleuritis is liable to occur. The late Dr. M'Dowel was, I believe, says Dr. Stokes, the first to describe this disease, of which the principal characters are, the rapid tumefaction and suppuration of many of the larger joints, accompanied with a typhoid fever, and followed by affections of the brain, lungs, heart, or digestive system. In such instances, I have more than once observed purulent collections in the pleura, lung, and pericardium. On this subject, Dr. M'Dowel's important papers, in the third and fourth volumes of the Dublin Journal of Medical Science ought to be consulted.

LECTURE LXXI.

DR. BELL.

TREATMENT OF PLEURISY—Bloodletting by venesection the first and chief remedy—In feeble habits and in advanced stages, cupping or leeching—Calomel followed by saline purgatives—Tartar emetic—Opium in full doses after venesection—Blister to the side—Purging most useful in complicated and epidemic pleurisies—Diuretics; nitre, digitalis, colchicum—Calomel with nitre and a little opium.—*Treatment of Sub-acute and Chronic Pleurisy (Dr. Stokes)*—Confinement of the patient to bed—Leeches to the affected side—Small blisters—Diuretics—Iodine—Diet at first simple, afterwards more nourishing—Morbid action of the heart; remedies for—Country air—Deformity; remedies for—Operation for empyema.—*Chronic Uncircumscribed Pleurisy with Effusion (Dr. Stokes)*—Symptoms—Physical signs of great importance—Decubitus—Effects of changes of position.—*Contraction of the Chest*—Recovery of natural size sometimes rapid—One of the first signs—*Differential Diagnosis.*—PNEUMOTHORAX—Causes, symptoms, and treatment.—HYDROTHORAX, its causes, symptoms, and treatment.

Treatment. — Universal experience, I believe I may say, is in favour of early and large bleeding in sthenic or sporadic pleurisy. The sooner after the invasion of the disease we bleed, and the more copious the depletion, the greater will be the probability of early convalescence. It would avail little were I to pretend to specify the quantity of blood to be taken from a vein on this occasion. You must be regulated by the violence of the symptoms, and the relief afforded. The pulse, which is generally frequent, hard, and resisting, ought to be abated in these particulars, especially in the quality of hardness or tension, by the abstraction of blood; but the state of the heart will cause modifications in this respect, and the pulse is less our guide than the dyspnœa and pain, in the freedom with which we are to bleed in pleurisy. As a general rule, the blood ought to be

allowed to flow until the patient can make a full inspiration without catch or pain. The repetition of venesection will be regulated by the renewal of the pain and dyspnœa, more than by the febrile symptoms. As regards mere frequency of pulse, it is of little moment in the case before us; it can never alone indicate the propriety of depletion. Indeed, it will rather indicate a fear of this having been pushed too far. It is desirable that, within the first twenty-four hours, an abiding impression should be produced on the inflammation; and hence, if the first symptoms return in even a few hours after the bloodletting, you should repeat the operation. As our object is not simply to weaken the heart's action, but to abstract a considerable amount of blood, and withdraw in this way the material of vascular excitement and engorgement, the patient need not be invited to sit up; but he should be bled lying down, so that there will be less probability of the coming on of syncope to interfere with the free flow of blood.

In weak habits of body, either from original constitution or excesses, although the phlogosis of the pleura be intense, and will, if not checked, be followed by the changes already described, yet we cannot continue to abstract the desired amount of blood, without weakening beyond measure the heart's action, and inducing a degree of prostration, which, if it do not actually endanger the patient's life, would prolong excessively the convalescence. We are fain, in such cases, to accomplish our end by free cupping or leeching over the seat of pain. In general you will not have the choice in the country, but must be content with cupping. After this is over, a large warm poultice should be applied and covered with flannel.

Adjuvants to bloodletting are indirect evacuants, such as purgatives and diuretics. The former will consist of salines with antimonials, so as to produce large evacuations, and thus diminish the quantity of the circulating fluid. Preceding these, a full dose of calomel will be of service, both as itself an evacuant, but still more, from its revulsive operation on the liver and gastro-intestinal follicles, and its decidedly sedative impression. Its continuance will be under the same belief, and not in reference to what the English writers persist in regarding its specific, that is, its sialogogue operation, or at any rate the production of a slight soreness and inflammation of the mucous membrane of the mouth and throat. Tartar emetic as a counter-stimulant does not stand as high in the estimation of British practitioners in pleurisy, as it does in pneumonia and bronchitis. My own experience leads me to a different opinion. I have, in some of the milder but yet well-marked cases of pleurisy, trusted almost entirely to tartar emetic, either mixed with cream of tartar in powder, or dissolved with it in water. Opium may be given with more freedom in pleurisy, as it may of phlegmasia of the serous or sero-fibrous membranes generally, than in those of parenchymas and mucous membranes, with whose secretory function it is more apt to interfere unseasonably at this time. A full, or rather a large dose of opium, two to three

grains, may be given at once after a large bleeding, and the patient be left undisturbed by the administration of any other medicine for the next twelve hours.

Pain or stitch in the side still remaining after the subsidence of fever will be met by leeches to the part; or if full venesection has been previously practised, a blister. More especially is this remedy useful when effusion is about to take place: it has been known to arrest this latter, and in other respects to exert a most salutary effect on the progress of the disease. The blister should be large, and allowed to remain on only until the skin be vesicated: with this view about eight hours will commonly suffice. It is not necessary that the cuticle be raised with serum to any extent; for if at all separated from the cuticle beneath, it will soon rise into large serous bags after the application of simple cerate or of basilicon ointment. Once discharging, this effect ought to be continued; first by the dressings just mentioned, or if there be much cutaneous sensibility, by a large poultice of flaxseed meal, or of bread and milk, between two pieces of muslin, and afterwards by the occasional application of weak blistering or tartar emetic ointment. The latter is preferable, if the disease assume somewhat of a chronic form.

Purging was thought by many of the older writers to be prejudicial in pleurisy; nor was the opinion without foundation, for the necessary interruption to the respiratory movements during defecation, the occasional straining at the time, must operate prejudicially. These objections, however, were derived chiefly from a belief that diarrhœa or natural purgation, when it occurred spontaneously, was injurious, and that intestinal evacuation interfered with the crisis by expectoration. In complicated pleurisy, or in that of an epidemic and, as it will be found generally, of a mixed character, purgatives, with calomel for their basis, are of unquestionable efficacy, and must often take the place of bloodletting. Diuretics have acquired more reputation in the cure of pleurisy than purgatives. The antiphlogistic action of many of them, apart from the amount of renal secretion, will go far to explain their superiority in this particular. Nitre may be mentioned as displaying these two effects in a notable degree. Its operation is made more efficient by free dilution; in fact, by its being dissolved in the patient's drink. I have at other times generally added to it tartar emetic, as in the following prescription:—

℞. Nitrat. potass., ℥iss.
Potass. tart. antim., gr. i.
Aqua fluvialis, ℥iv.
M. ft. solutio, et adde,
Lin. sem. infus., ℥xii.
M. Sum. æger, pro haustû.

Of this half of a large teacupful, sweetened and flavoured with lemon-juice, if required, will be taken by the patient at intervals of an hour

or two through the day. If the inflammation run high, two or three grains of tartar emetic may be directed, and the quantity of the nitre increased to two drachms, or even half an ounce, in the twenty-four hours, suitably diluted in a mucilaginous vehicle. Mucilage or syrup of gum-arabic may be substituted for the flaxseed tea, in the prescription which I have just given you, if required by the palate of the patient. It is not uncommon for vomiting to follow the first dose or two of this mixture, but I have seen no disadvantage from this, although it is deprecated by many writers, and is made a ground of objection to the contrastimulant use of tartar emetic in pleurisy.

Other diuretics of the sedative class will be had recourse to in pleurisy, more particularly when it assumes the subacute or chronic form. Of these, digitalis and colchicum are entitled to our chief confidence; the first in infusion or tincture; the second in vinous tincture of the seeds. Laennec speaks highly of the infusion of digitalis. Calomel in small doses is often one of our best diuretics, and the more so when combined with squills, and opium enough to make the combination sit well on the stomach.

Treatment of Sub-acute and Chronic Pleurisy (*Dr. Stokes*).— Here, again, I shall be content with placing before you all the views and practice of Dr. Stokes, in his own language, on these forms of pleurisy, including *empyema*. The physician will be frequently consulted by patients labouring under empyema of some standing. There is but little constitutional distress; yet the pulse is quick; the breathing hurried; and emaciation is going on. One side is found dull and dilated; the heart is displaced; and the respiration puerile in the opposite lung. In such cases, a cure may be effected by the following treatment: —

The patient must be confined to bed, and there remain for several weeks; this is a most important condition. His diet, for the first fortnight or three weeks, must be of milk, farinaceous substances, and vegetables. The bowels having been freely evacuated, an accurate measurement of the chest, above and below the mamma, is to be recorded; and the situation of the heart and extent of dulness carefully noted.

Leeches are now to be applied to the affected side, even though the case be chronic, and no pain whatever exists. From six to eight will be sufficient at each application, which may be repeated every day or second day, for the first week; during which time mild mercurials are to be steadily exhibited, till a slight but decided ptyalism is induced. After the first week, we may begin with small blisters, which are to be covered with silver paper, and applied repeatedly over various portions of the affected side.

At the end of a week or fortnight, we shall often find that the line of dulness is subsiding, and that the heart has returned to its natural position. In some cases, however, even after ptyalism, there is no change in the physical signs; but the patient, notwithstanding, feels a degree of relief which cannot be explained by the diminution of the effusion.

We are now (if fever be absent, and the pulse quiet) to slightly improve the patient's diet: we may allow light broths, fresh eggs, or perhaps a little chicken; and with this change in regimen, we are to resort to diuretics, the success of which seems wholly to depend on our having, by the early treatment, subdued all inflammatory action in the pleura.

For diuretics, the infusions of juniper or pyrola umbellata, combined with acetate and nitrate of potassa; the preparations of digitalis, and the spirit of nitrous ether may be employed.

But, in this stage, the remedy on which I have the greatest reliance is iodine, employed internally and externally; a pint of Lugol's mineral water may be taken during the day, and from two drams to half an ounce of the ointment, rubbed daily over the side. The effect of this treatment in promoting absorption is sometimes singularly rapid. The medicine generally acts as a powerful diuretic, and is to be continued until all liquid is removed from the pleura, as shown by the returning clearness and the friction signs.

In a few cases the heart continues to act too strongly after the absorption. For this the best treatment will be the application of a blister and the exhibition of the medicinal hydrocyanic acid, or digitalis, followed by the application of a large belladonna plaster; and the patient, for some time, must avoid all unnecessary muscular exertions.

After the absorption of the fluid, it will be always right that the patient should go to the country; or if there already, that he should change his air. Nothing so distinctly promotes the organisation of the false membranes as this.

I have now seen twenty cases of complete and permanent recovery from empyema by absorption. In two, the effusion was comparatively recent, of not more than a few weeks' standing. In one recovery took place, apparently from the patient being sent to the country; but in the remaining twelve, paralysis of the intercostals had occurred, and, in the majority, the heart was greatly displaced. The treatment, as above, was pursued with scarcely any variation in them all, and with a success truly gratifying. In several of these cases the constitutions were decidedly scrofulous, and in these the convalescence was for a time doubtful. In such cases, I would always recommend the use of the issue, and that the patient should pass the winter in some mild and sheltered situation.

In most of these cases the patients were under thirty years of age; in three, below ten. In one, which I saw along with my friend, Dr. Beatty, the disease occurred during pregnancy; yet the lady bore the treatment well, and was delivered of a healthy child at the usual time, and has since remained well.

Should deformity occur we may hope for its diminution by time. Carefully regulated gymnastic exercises might also be employed, and perhaps electricity, to restore the tone of the intercostal muscles.

From these facts we may safely conclude, in opposition to the experience of Willis, Broussais, and Laennec, that the probability of a cure and the efficacy of remedies is much greater than has been supposed. Willis, in his book *De Empyemate*, says: "*In tali casu pharmacia haud multum opus erit, sed tantum corpore preparatur illuc ad lateris apertionem procedatur.*

Operation for Empyema. — The results of the operation in empyema are anything but encouraging. This can be understood when we reflect on the following circumstances: —

First. From the nature of an important operation and the dread which it inspires it is neither proposed nor submitted to unless as a last resource; or, in other words, when there is the least chance of success. This is not giving surgery fair play; all other means have failed, and this very failure shows an unfit state of the constitution. The disease has lasted for a length of time, the lung is compressed, atrophied, or bound down by adhesions, so that it cannot again fill the chest, and, in consequence, the operation only substitutes a pneumothorax for an empyema. (*Dr. Townsend's Essay, op. cit.*)

In the next place, and from the same circumstance of chronicity, there is, as we have seen, a probability that tubercle of the lung is forming, and the operation is often performed while phthisis is advancing.

Thirdly. Gangrene of the pleura not unfrequently follows the operation: supposing that this arises from the introduction of air, M. Roux injects water, so as to nearly occupy the space of the fluid withdrawn.

Fourthly, and lastly. It will be found that in a very large proportion of cases operated on, *the sound of fluctuation was heard*, proving that air, as well as fluid, existed in the cavity. These are not cases for operation; for although there is the possibility of air and liquid coexisting without a pulmonary fistula, yet it is certain that this occurs in the vast majority of cases. The existence of the fistula, alone, is a powerful argument against operation, as it so materially interferes with the reëxpansion of the lung; but when we reflect that this fistula implies disease of the lung, and that this, in almost every case, is tuberculous ulceration, we can easily understand the failure of the operation.

But that, when performed with judgment, the operation has often succeeded, there can be no doubt. The cases which seem to demand it are those where a rapid acute effusion, threatening life, occurs; and next, chronic cases which resist treatment, such as I have described. But even in these cases, so long as life is not threatened, it seems much better not to operate, but rather give the patient the chance of the ultimate absorption of the fluid. That many of my cases would have been operated on by others, I have no doubt whatever. I shall not enter here into the history of the operation, but refer with pleasure to the learned and complete essay on this subject by my friend, Dr. Townsend, which gives the

accurate statement of our knowledge of the whole subject. See the Cyclopædia of Practical Medicine, article *Empyema;* also the Essay of Dr. Hastings, before quoted; and a note by the editors of the Cyclopædia, with reference to the experience of Dr. Davies which is favourable to the operation. Dr. Williams's and Dr. Davies's works must also be referred to.

I shall here merely remark, that I altogether agree with this excellent observer in his views as to the place of election in operating. He advises that the incision should be made higher up than is recommended — in the fifth rather than the seventh intercostal space. The lower situation was chosen by surgeons in order to facilitate the escape of the matter; but this was, perhaps, an erroneous view, for there may be a favourable evacuation of the fluid from any part of the chest. In most of the cases of "empyema of necessity" which I have seen, the tumour formed in the third or fourth intercostal space, near the sternum, and the operation was successful. I have seen a case with my friend, Dr. Houston, where the tumour formed immediately under the clavicle; the result was favourable. And in another instance, in the same gentleman's experience, the empyema opened above the clavicle; of this, several instances are recorded. Nature thus seems to point out, that the opening should be high up; and when we reflect on the danger of wounding the diaphragm, as in the cases recorded by Laennec, La Motte, and Solingen, we must prefer the higher opening. In Laennec's case, although the incision was made between the fifth and sixth ribs, the diaphragm was transfixed. I have seen an instance of the same kind; the particulars are as follows: —

In the case of empyema from gunshot wound, which I have already mentioned, the patient, from intense pain of the side, which never intermitted, kept himself constantly bent on the affected side; in consequence, the side was contracted, although with acute empyema. The operation, however, was performed in the usual place, between the sixth and seventh ribs, but no fluid escaped. On the finger being introduced, the sensation of a bag of liquid was conveyed; and it was obvious that the knife had penetrated below the diaphragm. A trocar was now thrust upwards, which perforated the diaphragm, when a little sero-purulent fluid escaped, without any relief; the patient soon afterwards sank. It was found, on dissection, that the kidney had been wounded deeply in its upper portion; upwards of a pound of blood was effused into the surrounding cellular tissue; and the perforation of the diaphragm by the trocar was easily demonstrated. The orifice seemed to have been closed by the coagulable lymph.

The mode of operation, by the repeated removal of small quantities of fluid, as recommended by Morand, should in all cases be preferred; but particularly in the chronic effusions, where the lung has been long compressed, and probably atrophied. Time must be given for its gradual development, for the restoration of its circulation and permeability, and for the return of innervation to the inter-

costals and diaphragm. The necessity for this mode of operation will be of course greater where the fluid is purulent than in the serous effusions. Indeed, in chronic cases I would recommend that not more than a few ounces of fluid should be withdrawn at each operation. See Morand, *Mémoires de l'Academie de Chirurgie;* also, Boyer, *Traité des Maladies Chirurgicales*, who gives a case remarkably illustrative of the danger of complete evacuation.

Chronic uncircumscribed Pleurisy, with Effusion (Dr. Stokes). — On this subject I shall let Dr. Stokes speak. To this condition, whether supervening on an acute and violent attack, or from the first with sub-acute symptoms, the name of empyema has been long given. And although the composition of the fluid effused is often different from that of pus, it being sometimes bloody or serous, yet the term is applied conventionally to these as well as to the purulent effusions.

Chronic effusion, compressing the lung and displacing the mediastinum, may exist with or without distressing constitutional symptoms. In the first case, if we separate the physical signs, we find nothing characteristic in the symptoms alone; hectic may or may not be present; and no characters of the cough, expectoration, respiration, decubitus, or with a single exception, the appearance of the patient, are sufficient to distinguish this from other diseases of the lung. The exception alluded to, is the dilatation of the side and intercostal spaces — a subject which we shall just now handle.

But if, in addition to the symptoms of pulmonary irritation and obstruction, as shown by cough, dyspnœa, increased by exertion, and by lying on the healthy side, and a sense of fulness and oppression referred to one side, which is often œdematous, we find the physical signs of accumulation, compression, displacement, and paralysis of the thoracic muscles, we may safely diagnosticate the disease in question.

In certain instances, however, the symptoms are all but wanting. I have repeatedly known, says Dr. Stokes, persons with copious effusions to look well; to be free from fever, pain, or any local distress; to lie equally well on both sides; to have good appetites, which they could indulge without apparent injury; and all this when the heart was pulsating to the right of the sternum.

Thus it appears that, in both classes of cases, the physical signs are of the last importance. Indeed, in pleuritic effusion, physical signs have greater value than in any other thoracic disease. Most cases of bronchitis, of pneumonia, and of phthisis, can be at least recognised without these aids: but such is not the case in pleurisy; and it is fortunate that its physical signs are more simple, numerous, and striking, than those of any other of the uncomplicated diseases of the lung.

In the failure of the attempt to found any differential diagnosis on the symptoms of chronic pleurisy, considered apart from physical signs, we must study the latter with care, and the more so, as the statements on empyema contained in surgical books are exceed-

ingly loose and insufficient. Before entering on the signs, however, we shall recur to the subject of decubitus on the affected side.

As a symptom of copious effusion, we meet with it more frequently in the chronic cases; yet even here it is often absent. As a sign, it is anything but pathognomonic; as a constant symptom, I have only observed it in extreme cases, and where the mediastinum and diaphragm were extensively displaced. Facts are still wanting to clear up the cause of this symptom. Richerand, believing that the mediastinum was a strongly resisting septum, denied the doctrine of Le Dran, that the difficulty of lying on the healthy side arose from the pressure of the superincumbent fluid, and attributed it solely to the obstruction to dilatation of the healthy side, in consequence of its being placed undermost.

But the extensibility of the mediastinum cannot be denied. The fact, which I have often observed, of displacement of the heart before that of the intercostals, or diaphragm, is sufficient. On this point, Dr. Townsend observes, that in cases of pneumothorax with empyema, we have direct proof of the influence of the weight of the fluid.

"The patient can generally lie on the sound side so long as the effusion is principally gaseous; but as the proportion of ponderable fluid increases, decumbiture on the sound side becomes impossible. In like manner, in cases of empyema, the dyspnœa is in general greatly aggravated by lying on the sound side; but when the fluid is evacuated, the patient is immediately enabled to turn on the sound side, although the necessity for its free dilatation continues as great as before, the diseased being still in a state of perfect inaction. In the case of pneumothorax with empyema, related in the fifth volume of the Dublin Transactions, in which the operation of paracentesis was performed, the patient was enabled to lie on the sound side the night after the fluid was drawn off, though it was ascertained by auscultation that the side was then filled with air, and the necessity for the free dilatation of the sound side consequently as great as before the operation.

"These observations render it probable that the difficulty of lying on the sound side arises from the load which is thereby thrown on the mediastinum, as well as from the obstruction which the muscles of inspiration experience when the side which they have to dilate is placed under the weight of the body. To avoid this inconvenience, patients labouring under effusion into the chest generally lie on the diseased side, or else on the back, with a slight inclination of the body towards that side. This latter position is the more general of the two, and is so very characteristic, as to lead, in some cases, to a suspicion of the disease, even before any further examination has been made. This position, however, is not so constantly observed, but that we meet with frequent deviations from it. When the fever has completely subsided, and the thoracic viscera have become habituated to the pressure of the effu-

sion, the patient can sometimes lie indifferently on his back, or on either side; and there are even some cases on record where the patient lay constantly on the sound side. J. F. Isenflamm relates a remarkable case of this kind, in which a patient, presenting all the usual symptoms of empyema, lay generally on the right side, which, for this reason, was supposed to be the seat of the disease; accordingly, the operation was performed, but no pus was found. (*Versuche einer Praktischen Abhandlung ueber die Knochen.* Erlangen, 1782.) The patient died; and on dissection it was discovered that the left side was the seat of the empyema. Morgagni relates a case of this kind, on the authority of Valsalva: and M. Baffos records another instance. (*Dissertation Inaugurale sur l'Empyeme.* Paris, 1814.) These, however, may be considered as exceptions to a general rule, and probably depend on some adhesions which confine the effusion, and prevent its gravitating to the most dependent part of the chest. (See Dr. Townsend's Essay on *Empyema*, Cyclopædia of Practical Medicine.)

There seems, continues Dr. Stokes, reason for admitting both the explanations of Richerand and Le Dran, as adopted by Dr. Townsend; for, although the decubitus on one side interferes less with respiration of the corresponding lung than we would, *à priori*, suppose, yet it has some effect; and, on the other hand, it is easy to conceive a case in which the fluid, by lying on the mediastinum, would, by its weight, oppress the heart and affected lung. In an extreme case, however, where the pleural sac was at its maximum of distention, it seems possible, if the patient had become habituated to the new condition of the mediastinum, that decubitus on the healthy side would not cause so much distress as in cases with less effusion.

But there is another cause as yet unnoticed, namely, the effect of change of position on the abdominal viscera. In a case with protrusion of either ala of the diaphragm, the turning on the healthy side would, by increasing the pressure on the abdominal viscera, impede the descent of the opposite portion of the muscle, and consequently produce distress of breathing. It would have the same effect as we see from accumulations in the bowels, or from external pressure, as accurately observed by Dr. Townsend, who, in testing the statements of Bichat and Roux, that pressure on the side of the abdomen corresponding to the effusion caused extreme distress, by forcing up the fluid, and increasing its pressure on the lung, found that the very reverse was the fact; for, while no uneasiness was produced by pressing up the diaphragm on the side where the effusion existed, any attempt to stop the motion of the opposite ala of the muscle caused extreme and immediate distress. (Cyclopædia of Practical Medicine, article *Empyema*; also, Professer Chomel, Dictionnaire de Médecine, article *Pleurisie.*) This eminent and accurate observer's experience coincides with that of Dr. Townsend.

Considering the great weight and mobility of the liver, we should expect that, in empyema of the right side, there would be greater distress from the cause now pointed out than in the opposite case.

Contraction of the Chest. — I have known, says Dr. Stokes, for it is still he who addresses us, many cases of pleurisy to recover, without contraction of the side, or depression of the shoulder: these were cases of sub-acute inflammation, or where the effusion had been rapidly removed. In other instances the contraction has been confined solely to the lower portion of the chest, while the shoulder was not depressed: and in several, where the disease occurred in young persons, the deformity was either removed in process of time, or so much diminished as to be scarcely perceptible. I have had no experience as to the connection of this termination with the hemorrhagic pleurisy, on which Laennec has dwelt so strongly; on the contrary, it appears to me, that the more violent the inflammation, the greater is the probability that contraction will accompany the cure, and it seems likely that the paralysis of the intercostals and diaphragm, by interfering with the expansion of the side, has an immediate effect in producing this result. We must agree with Dr. Forbes, that this deformity is not the consequence of hemorrhagic pleurisy exclusively; but that it is a common termination after the removal of purulent effusions, whether by absorption or operation. And if other evidence were wanting, we have it in the analogous contraction in chronic pneumonia and phthisis. See his original cases for two instances of contracted chest. Dr. Forbes refers to Dr. Hastings' valuable paper on *Empyema*, Edinburgh Journal of Medical Science, No. 1; to cases by Baron Larrey, Journal Comp. de Sc. Med. 1820; and to Mr. Jowell's case, Med. Chir. Rev. 1826; in which, as I have observed, the contraction was partially removed in the progress of cure.

The return of dilated side to its natural circumference is sometimes exceedingly rapid. I have known a dilated side to lose as much as an inch and a half in eight days. In some, the contraction is shown merely by the flattening of the anterior portion, causing visible deformity, yet with but little alteration of size. In others, the affected side becomes of a triangular form, the base of the triangle corresponding to the median line, and the apex to the centre of the ribs. Even this condition, when occurring in the young person, may be much improved by time.

One of the first signs of the absorption, with contraction, is the increased prominence of the inferior angle of the scapula.

I have known the dulness consequent on the cure of a former pleurisy to be mistaken for that of recent hepatisation. Fever, with slight bronchitis, had supervened. The dulness was discovered, and no farther examination, either into the history or accompanying signs, being made, the most improper treatment was pursued.

But contraction of the chest, in connection with empyema, may occur under circumstances very different from those described by

Laennec and subsequent authors. *It may coincide with an increasing empyema, and occur at a very early period of the case.* This interesting circumstance I have known to occur in two cases. In both, pleuritis with effusion followed on injury, and long after the effusion there was exquisite pain whenever the patient attempted to expand the side. In one case, the patient, up to the period of death, kept himself strongly bent on the affected side; so that the case presented the singular combination of a vast empyema, with extreme contraction of the affected side.

Differential Diagnosis. — The diseases with which a pleuritic effusion is commonly confounded, are the following: —

1st. Tubercle of the lung.

2d. Pneumonia, in the stage of hepatisation.

3d. Enlargement of the liver.

Nothing is more common than the error of taking cases of pleuritic effusion for pulmonary tubercle. The patient may recover, or die of tubercle, consecutive to the absorption of the empyema. In the first case, the physician felicitates himself on the cure of a consumption; in the next, on the accuracy of his diagnosis. In both instances he is mistaken.

The cases generally mistaken for phthisis, are of two kinds: there is either a circumscribed and chronic effusion, which may exist without much eccentric displacement; or there may be a copious sub-acute effusion compressing the lung, and occurring in the lymphatic subject.

In the first case, we generally find that the health does not suffer in proportion to the extent of disease, as indicated by the stethoscope. The dulness is complete, as is also the absence of *râle*, and often of respiration; and when these signs occur in the lower portion of the chest, we have a group of circumstances quite unlike the phenomena of phthisis.

I have seen several examples of the second case. A child, of a lymphatic temperament, is attacked with pain of the side, fever, and cough. Phthisis is apprehended, and, after a fortnight or three weeks, the whole side is discovered to be dull, and tubercle is diagnosticated with mistaken certainty. The following circumstances should correct this error: —

1st. The absence of the usual constitutional suffering, in cases of acute phthisis.

2d. The fact of complete dulness of the side occurring in so short a time.

3d. The lung being impermeable except, perhaps, in the upper portion, where a feeble murmur without *râle* can be heard.

4th. The signs of mediastinal displacement.

In the sub-acute cases, the signs of diaphragmatic or intercostal displacement are often wanting.

Pneumothorax (from πνευμα, ατος θωραξ), *Air in the Pleura.* — This morbid state may occur in three different ways: — 1. It may be the

consequence of partial pleurisy, the effusion in which being absorbed leaves a void which is sometimes filled with air secreted by the membranes. This kind is very rare. 2. Pneumothorax of an idiopathic kind arises from the effusion or secretion of air into the sac of the pleura without perforation, in a manner analogous to the secretion of air from the peritoneum, constituting tympanitis. This is, also, an unusual occurrence. 3. The most common kind of pneumothorax is that caused by some unnatural communication between the pleural sac and the external air; and this may be by a perforation either of the external parietes or of the pulmonary pleura. The latter is the now usually recognised kind of pneumothorax, and constitutes a great majority of the cases met with in practice. The perforation depends on the progress of ulceration, which is generally of a tuberculous character, and, but rarely, of gangrenous abscess, through the pleura.

The *causes* of pneumothorax are detailed by M. Andral (*op. cit.*). Its idiopathic origin is rare. Most commonly (if we except traumatic pneumothorax, or that proceeding from a penetrating wound of the thorax and costal pleura) the cause is external to the cavity of the pleura, and consists in a pulmonary lesion. Sometimes it is owing to a fistula which opens a communication between a tuberculous cavity and the pleura; sometimes an abscess, the consequence of pneumonia, opening in the pluera; pulmonary apoplexy destroying the lung and the pleura; a cancerous ulcer of the lungs, or, as M. Andral has twice seen it, a simultaneous rupture of some of the pulmonary vesicles and the pleura.

Symptoms.— These consist in —1. A dyspnœa of greater or less severity, according to the quantity of gas, and the rapidity with which it is formed. 2. A convexity of the thorax; but this is not a constant symptom. 3. An unusual sonorousness, on percussion, through the whole extent of the diseased side, or only at the upper region, for, lower down, a dull sound indicates a liquid effusion. 4. The absence of the respiratory sound, coinciding with the sonorousness. 5. Sometimes an amphoric or cavernous respiration. 6. If there are air and liquid effused, a gurgling, at first not very sensible, but augmenting each day, in the inverse proportion of the amphoric respiration and the sonorousness. 7. A metallic tinkling, the cause of which is not hitherto known. 8. If there be at the same time liquid effused, succussion causes a noise of displacement, or a splash of the liquid against the walls of the chest.

The *diagnosis* is well summed up, in its main features, by Dr. Houghton (*Cyclop. of Pract. Med.*).

1. The sensation of something giving way in the chest, and of air entering the pleural cavity. Very variable, but often absent or unnoticed.

2. In a phthisical individual the sudden supervention of overwhelming dyspnœa and pain. Rarely absent, therefore very valuable; still more so if succeeding last sign.

3. Comparison of auscultation and percussion. Nullity of respi-

ration over one side, together with tympanitic clearness of sound, which below terminates abruptly in complete dulness. If accurately established, amounting to positive certainty, but sometimes not easy to establish. Œgophony rare.

4. Fluctuation on succussion. Positive certainty, but should be unquestionably verified.

5. Metallic tinkling. Positive certainly, but should be unquestionably verified. This metallic tinkling is audible during coughing, speaking, and sometimes during respiration, or, more correctly expressed, after these movements. Besides this, adds Dr. Houghton, it is often heard independently of these, observing a certain periodicity, and finer in its tone.

The *duration* of pneumothorax may be from a period of a few hours ending in death, or it may extend to several days, and even more than a month.

Its *termination* may be favourable, and brought about by the absorption of the effused air; but most generally death is the result.

The *treatment* of pneumothorax promises but little more than merely to palliate some of the worst symptoms, by the alleviation of pain, and making the respiration somewhat easier. Its first and sudden occurrence, causing, as it does often, great prostration and irritating cough, may require a full dose of opium combined with antimony or calomel. Subsequent reaction with fever will be treated by venesection, if the patient be not much reduced by long prior disease; and in other cases by leeches or cups to the chest. In fact, as perforation of the pleura and consequent pneumothorax are, in the larger number of cases, additions to a previously existing disease, such as phthisis, the treatment must necessarily be modified not a little by the stage of the chief and primary diseases, and the remedies which have been employed or were in use at the time. Blistering and other means of counter-irritation will generally be allowable in the emergency.

The immediate indication, where, in consequence of the smallness of the perforation or its valvular condition, air accumulates in the chest and becomes a cause of oppressive dyspnœa, is, as Dr. Williams justly observes, to give vent to the air by puncturing the chest. Temporary relief has been afforded in several instances by this means; but before this operation is performed, it should be considered whether, as it can give only temporary relief, the condition of the patient be such as to make this likely to outweigh the pain and risk of the operation. These certainly are not great, but when added to the dubious view in which the friends of the patient may regard an operation which proves but imperfectly successful, they are enough to deter us from the responsibility of recommending it in many cases. The circumstances are different when the accident occurs before the consumptive disease has advanced far, when there is still much flesh and strength, and the physical signs have shown that there is a considerable quantity of sound lung. The

operation may be repeated if the air accumulate again. As it is impossible to avoid the continued introduction of air into the chest, the mode of performing the operation is a matter of much less consequence than in empyema. It is more desirable to puncture low down in the chest, to permit the discharge of the liquid as well as the air.

The following case, recorded by Dr. Stokes in the work so often borrowed from in these lectures on the diseases of the respiratory apparatus, will be to you a good clinical lesson: —

Gangrene of the lung, empyema, and pneumothorax—Paracentesis—Gangrenous destruction of the costal pleura—Passage of the fluid behind the peritoneum.

A gentleman, æt. 36, generally very healthy, with a large, well-formed chest, had occasionally complained, for the last few months, of pain in the chest, at one period very severe; he had been cupped and blistered, but without relief: at length hectic symptoms set in, with restless nights; soon after, he felt as if something gave way in his side, and immediately expectorated a horribly fetid matter. A similar attack occurred in a few days, with the same fetid discharge, but accompanied by prostration, lividity of the countenance, and dyspnœa. I saw the patient along with Dr. Marsh and Mr. Crampton. We found the chest to contain air and fluid; and in consultation made the diagnosis of gangrene of the lung, and advised paracentesis. The operation was performed between the seventh and eighth ribs, a little below and external to the right mamma; the withdrawing of the trochar gave issue to a quantity of fetid air; a probe was introduced, and met by an elastic resisting substance; this was apparently perforated, and about three quarts of dirty, gray-coloured, fetid fluid given exit to. Great relief followed the operation. The patient, however, passed a wretched night, with hectic paroxysms; no discharge occurred from the wound.

17th. The trochar and canula were introduced, and a quart of the same fetid matter came away — patient felt easier; passed a bad night.

18th. A pint of fetid matter was taken away; spent a most uneasy night, with incessant cough and frothy expectoration; the act of coughing sending the fetid air and matter through the external opening in great quantities.

19th. Much exhausted; said he felt as if there was a well in his chest; he was sensible of a constant dropping of fluid; pulse 120; great weakness; heat and soreness in the side.

20th. Mr. Colles saw him, in consultation with the other attendants. Anodyne enemata and stimulants were ordered; he passed a better night, but had great dysuria; ordered mucilaginous drinks.

21st. Passed a bad night; pulse 144, and weak; during a fit of coughing, which brought on the usual discharge from the wound, about a cupful of blood gushed out.

22d. The introduction of a gum-elastic tube gave exit to no fluid,

but a great quantity escaped while the patient coughed; the abdomen became tense and tympanitic, with exacerbation of all the symptoms, and the patient died in about thirty-six hours.

Dissection. — Externally the body presented some livid marks at the right side, and a slight fulness in the right inguinal region and side of the scrotum. The right pleural sac contained above a quart of fetid purulent fluid; the lung was of a dark greenish hue, smeared with a creamy substance; its lower and back part destroyed by gangrene, leaving a large greenish-coloured cavity, the size of the hand. The substance of the lung near this was easily broken down, and the vessels and bronchial tubes were seen passing through it; the remainder was gorged with a frothy, dark sanies; the whole lung was reduced to half its size; some adhesions united it to the mediastinum, almost forming a circumscribed cavity: the costal pleura was in some places highly vascular; in others, covered with lymphy secretion; in some places very tenacious. In one patch, destroyed by gangrene, the intercostal muscles were laid bare for the space of several inches, and were in one part sloughy, forming an opening at the inferior and posterior part, at which place nature had attempted an outlet for the fluid — the latter having made its way into the cellular tissue, beneath the skin, and between the peritoneum and abdominal muscles, down the side of the abdomen to the scrotum. The general cavity of the right side was much diminished by the liver having been displaced upwards by the flatus of the intestines; the liver was in such close apposition with the lung, as to be in danger of being wounded by the trochar; thus accounting for the fluid not coming off by the canula in the first instance.

Hydrothorax (from ὑδωρ, water, and θωραξ, the chest), *Water in the Chest.* — We may restrict the term to serous effusions in the cavity of the pleuræ. One among the many evidences of an amended pathology deduced from morbid anatomy is our better knowledge of the causes and real character of dropsies of the chest, including both hydrothorax and hydropericardium. No longer regarded as, in general, a primary disease, we see in these effusions, as indeed in all those of serous sacs, an effect, or symptom in fact, either of inflammation of their membranes or of impeded circulation. Recognising these two as the chief if not sole causes of hydrothorax, we see in the first variety, or that from inflammation of the pleuræ, active hydrothorax, while the second variety, which may be called passive, is caused by interruption to the circulation, either by organic diseases of the heart or congestion of the lungs, and tumours at the root of these latter. Sometimes hydrothorax results from diseases of the kidneys, from a febrile state connected with the exanthematæ, particularly scarlet fever; and from a sudden suppression of cutaneous exhalation. In some of these cases it may be associated with œdema of the lungs, increasing greatly the distress and the danger.

The *treatment* of hydrothorax will be regulated very much by a knowledge of its cause. If the effusion have ensued on inflammation of the pleura, either simple or combined with pneumonia, our remedies should be the same as those directed for sub-acute or chronic pleurisy and pneumonia. Accordingly, a few cups on the affected side, or a blister kept discharging, and calomel with squills and nitre, or if the bowels be irritable opium may be used with good effect both towards removing the morbid secretory action and promoting absorption. Hypertrophy of the heart and a full hard pulse is sometimes to be met by venesection, followed by calomel and nitre, and digitalis with colchicum. In cases of irregular circulation, with much oppression and symptoms of venous congestion, digitalis, with the alkalies and tonics, will constitute the outline of treatment. Active hydrogogue cathartics, which are well represented by the compound powder of jalap or gamboge with cream of tartar, often give great relief in hydrothorax. When in an enfeebled or cachectic state, efforts at spontaneous relief are made by expectoration, this should be encouraged by the use of polygala senega with carbonate of ammonia. When we have reason to believe that hydrothorax is caused by diseased kidneys, mercurial purgatives, the blue mass with some narcotic, and diaphoretics, will be of most service.

Counter-irritation must constitute a leading part of the treatment of hydrothorax. Blistering has been already mentioned, but in order to be efficient the discharge must be kept up by the repeated application of some vesicatory substance. Setons have been highly recommended with similar intent.

LECTURE LXXII.

DR. BELL.

PHTHISIS PULMONALIS. — Its causes and special pathology—The disease caused by *tubercles* in the lungs—*Pathological Anatomy of Phthisis*—Tubercles—their stages and characters—*Granular or crude stage;* accompanied by consolidation—*Second stage, or that of elimination and softening*—How brought about—*Third stage, or that of ulceration*—Vomica—Infiltrated tubercle—Order of change in tuberculous lungs—Description of vomicæ—Associated lesions of other organs with tuberculous lungs—The mucous surface of the larynx and bronchia and that of the small and large intestine most commonly diseased by inflammation, ulceration, and formation of tubercle in phthisis pulmonalis.

PHTHISIS PULMONALIS — PULMONARY TUBERCLE, or TUBERCULAR PHTHISIS. — Dr. Stokes having declared his intention to confine himself solely to the diagnosis and treatment of phthisis, it remains for me to say something about the causes and special pathology of this formidable disease. Fortunately just now, the circumstances that make this task easier render at the same time its discharge a less imperative duty for me. The works of MM. Laennec and Louis and of Sir James Clark on phthisis, are of ready access to

all, since they are all republished in the United States. From them is the lecturer most inclined to draw, in making up a summary description of the disease, if, indeed, he did not feel that this has been done to his hands by M. Andral in his, by me, so oft quoted work (*Cours de Pathologie Interne*). A very clear, connected, and good digest of the subject you will find, also, in the lectures of Dr. Williams, which it has been my good fortune to collect from the *London Medical Gazette*, and send forth to the American reader in a book form, in the *Select Medical Library*.

Phthisis Pulmonalis, or *Pulmonary Consumption*, is now almost everywhere among medical men understood to designate a disease caused by the presence and development of tubercles in the lungs. The olden creed, that a wasting away of the body, a *decline*, may be caused by protracted irritation and inflammation of an organ, holds sway no longer; and few are found to speak even of a laryngeal and pulmonary, still less of a gastric, an hepatic, an intestinal, a splenic, and a renal consumption. It is not to be denied that irritation or inflammation of any one of these organs, — pneumonia, gastritis, &c., — may quicken consumption into fatal activity; but it is by their developing the growth of tubercles of the lungs.

Pathological Anatomy of Phthisis, and first and chiefly as respects *Tubercle*. — On examining the lungs of persons who have died of consumption, we find them greatly changed from their natural condition, in their being consolidated into irregular masses; and on cutting into them they are generally also excavated in parts, which are either empty, or contain a thick liquid matter. A closer examination reveals to us more precisely the morbid structural changes which thus present themselves as it were in mass. We discover, on pressing the softer part of the lung between the finger, a number of little hard bodies, and on cutting into it we see that they are roundish granules, of a light, semitransparent, reddish-drab, or skin colour, sometimes more grey or ash-coloured, more rarely devoid of colour, and quite transparent, of sizes varying from a pin's head to a hemp-seed. These bodies are tubercles, which, in their different sizes, appearances, intimate structure, and products, offer three distinct stages of growth; viz., 1, of incipient development or of crudity; 2, of elimination or softening; 3, a period of excavation or of cavity.

The tubercles of the first period correspond with those already described when a soft part of the diseased lung is examined. They are hard, destitute of organization, and disseminated in masses of more or less size, or intimately combined with the pulmonary parenchyma which is in a state of infiltration; sometimes they occupy only some lobuli, or again a whole lobe, and even the entire lung itself. Their number is variable. Sometimes they are found singly, studding a tissue otherwise healthy; but more commonly they are in groups of several together, and then they are either clustered in branches like berries, or they form a considerable mass, with the interstitial tissue consolidated and indurated between

them. They are most commonly distinct in the inferior lobes; in the upper parts and near the root of the lung they are usually conglomerated in masses. Their chief seat is at the summit of the lungs; and when they are met with at the same time in the inferior tubes, they are always at a less advanced stage than those of the upper lobes.

Before describing the two stages of tuberculous growth and change consecutive to those in the first or crude stage, we may naturally pause and ask, what is the primitive state which, again, involves the question, What is the origin of tubercle? On this point I shall not detain you long. Laennec believed that tubercles began like small transparent grains, of a grey colour, but sometimes almost colourless, and of a size varying from a millet to a hemp-seed. These he denominates *miliary granulations — grey tubercle.* In the middle of some of these diaphanous and colourless bodies, Laennec describes, as visible, a slight opaline or greyish tint: if cut into, they exhibit in their centre a yellowish and opaque point, which indicates their transformation into *yellow tubercles.* According to this celebrated teacher, we can find, at times, yellow and opaque tubercles in the lungs as small as granulations, and they are sometimes softened too. One of them bruised between the fingers feels like cheese: this is tubercle proper. The lungs which are the seat of granulations exhibit, also, tubercles proper, or those of a more advanced growth, and, like them, the granulations are disseminated or agglomerated in other tissues and organs, and with the same variety of colour and transparence, — as in the pleura and peritoneum, and in the intestinal ulcerations of consumptive persons.

M. Louis, whom I shall quote as I find his facts and views recorded both in his book, *Pathological Researches into Phthisis,* translated by Dr. Cowen, and in his article *Phthisie* (*Dict. de Medecine*), adds the weight of his own observations to those of Laennec; and says, that he has seen almost always the granulations larger, more numerous, more yellow and more opaque in their centre in proportion as they approached the apex of the lungs, where tubercles most commonly have their seat.

M. Andral, after expressing his dissent from the views which I have just presented to you of incipient tubercle, adds, that there is not that uniform co-existence, alleged by Laennec, between the miliary granulations and tubercle in other parts of the body than the lungs, since they are only seen together in the pulmonary tissue. M. Andral then proceeds to give his own views. He regards granulations not as accidental formation, but as the result of modified nutrition, and made by indurated and hypertrophied pulmonary vesicles, constituting one of the anatomical forms of pneumonia (*vesicular pneumonia*). The granulations of serous membranes, he regards as nothing more than the rudiments of false membranes, and those in the mucous membranes as hypertrophied follicles. Constantly he has found these granulations to be red and soft before they became grey and hard. Finally, the appearance of the

granulation is displayed artificially after the incision or laceration of pulmonary lobuli.

Dr. Baron believed that tubercles at first consisted of cysts with transparent sides, from the interior of which was afterwards secreted the greyish-white matter. Although M. Dupuy at the veterinary school, at Alfort, often found cysts and tubercles existing simultaneously in the same animal, yet this conjunction is not common in the human species, and, upon the whole, pathological inquiry does not favour this view of Dr. Baron. MM. Cruveilhier and Magendie suppose that tubercles were primarily fluid, and consisted of pus which gradually becomes solidified by the absorption of the thinner portion. M. Andral adopts this opinion in a general, perhaps we might call it an abstract sense. It is; that as all the component parts of our bodies are primarily liquid, tubercle must come under this general law. But this admitted, how comes the tubercle to pass from a liquid into a solid state? Dr. Carswell believes it to be a peculiar secretion which takes place from mucous membranes; but that it may accompany other secretions, such as that of inspissated mucus in the air vesicles, or of dense false membranes in the pleura or peritoneum. But if we examine the miliary bodies minutely, we fail to find inspissated mucus adequate to account for their hardness, which is in the texture itself, and not merely contained within cells.

Dr. Williams presents the question of the formation of tubercle in a luminous point of view, by following out a series of pathological changes, from simple morbid secretion to that of tuberculous matter totally devoid of organic form, its particles even not being globular, but irregular, like that of mere dirt or clay, and it must remain where formed a dead, inert mass, until decomposed by chemical agency, or changed by the operation of the surrounding tissues. But, for a better understanding of his argument we ought to have passsd in review the other stages of tuberculous growth. Let us, previously, with M. Andral inquire into the precise seat of tubercle. Observation shows that this matter may be equally produced at the surface of the pulmonary mucous membrane, either in the bronchia, or in the air-cells themselves; also in the cellular tissue interposed between the several parts of the lungs. M. Andral believes that tubercle may be formed in the lymphatic ganglions, — a favourite idea, by the way, of Broussais, who was disposed to regard this gland as the chief seat of tubercle consequent on irritation of the respiratory mucous membrane.

As it is not yet decided that the miliary granulations are really nascent tubercles, we ought, before proceeding farther in describing stages, to have a clear idea of tuberculous matter as it undoubtedly presents itself before it has undergone much mutation or become softened. A common state of parts, often but not universally associated with the presence of miliary granulations, is consolidation, of no particular shape or consistence, often nearly as hard as these bodies, and possessing in degree their semitransparence and colour. Generally, this consolidated matter is of a darker hue, from the colour of the blood and the black pulmonary matter in it. In

spots of this matter we recognise opaque, yellowish-white masses of various form and size, generally somewhat rounded. Some of them are nearly as solid as the dark or semitransparent indurations, but they are much less tough; others have more or less of a cheesy consistence, and some are found in parts approaching to a state of grumous fluidity, but still retaining their light colour and opacity. These opaque masses are commonly found within the indurations, from which they appear to be formed, and they are just of the same character as the specks before described which occur in some of the single or agglomerated miliary granulations. It may be inferred that the clusters and nodules of granulations are, also, converted into this same opaque, friable, yellowish-white matter. This matter, continues Dr. Williams, whose version of this state of tuberculous growth I am now giving, is entitled indisputably to be called *tuberculous*. It is occasionally found in other situations unaccompanied by any induration; such as in the interior of dilated vesicles and bronchial tubes, in masses under the pulmonary pleura, and in the bronchial glands. In these instances it is commonly of a friable or cheesy consistence, and has not the hardness which it seems to retain for a while when it has originated in the indurated tissue.

Second Stage of Tubercles. — This is the stage of elimination or softening, which succeeds that of development or crudity, in a period of more or less duration. Generally, the softening takes place in the centre and proceeds to the circumference. The tuberculous matter becoming softer and moister, assumes an unctuous and soft, cheesy appearance, and at last resembles pus, or a colourless liquid mixed with opaque shreds of tuberculous matter. Of the cause of the softening of the tubercles, pathologists entertain different opinions. Some, as Bayle and Laennec, believe that tubercles have an inherent power of softening, as they had primarily of developing themselves. Broussais and Bouillaud attribute the change to inflammation. M. Andral adopts the opinion of M. Lombard, and believes that tubercles acting as foreign bodies on the tissues to which they are adherent, or in which they are imbedded, irritate them and give rise to a secretion of pus which mechanically separates the tuberculous matter. M. Louis thinks that the change is brought about by the new organization of vessels in the tubercles themselves. The process of softening having been gone through, other phenomena occur which constitute another stage.

Third Stage, or that of Ulceration. — This is begun by changes analogous to those by which the skin in contact with an abscess is rendered thinner and is finally perforated. Around the liquefied tuberculous matter the pulmonary tissue is red and destroyed: the bronchial tubes soon participate in this destruction, and open a free passage by patulous orifices to the tuberculous matter, which is now expelled by expectoration. The cavity left in the lung after the process of evacuation and expulsion of the fluid matter of the tubercle is called *vomica*.

Not unfrequently the tuberculous matter is found diffused through a considerable extent of the pulmonary tissue, constituting the *infiltrated tubercle* of Laennec. In its earlier condition, the lung in this state closely resembles the last stage of hepatization, when the opacity, which precedes suppuration, shows itself. It is very much mottled or marbled; for, besides the yellowish-white opacity which is seen in different degrees in its different parts, there is the black pulmonary matter giving it a grey or greenish colour; and there are, also, the whiter coats of vessels and interlobular septa, and spots of red tissue less affected. When the lung in this state is cut or torn, which it commonly may be with facility, its interior presents a granular surface, like that of hepatization; and except that its colour is more varied, and it has generally more of the light opacity of tuberculous matter, it resembles a hepatized lung more than anything else. But in it are seen what we rarely meet with in hepatized lungs, circumscribed abscesses or cavities, containing a fluid matter. These circumscribed cavities are vomicæ.

In summing up the changes in the lungs of a phthisical patient, we find them, says Dr. Williams, to occur under two heads: — 1. Consolidation, generally of an indurated kind, and either almost colourless and transparent, or of a pearly grey or reddish-drab, or of a dark red or more dingy colour. 2. An opaque, yellowish-white, parsnip-coloured, friable matter, of various degrees of consistency, being first hard and afterwards becoming soft, and forming vomicæ: this lighter opaque matter, which is properly called tuberculous, is produced commonly within the consolidations just named, but sometimes elsewhere. To this description we may add a few words on the nature of the walls of the vomicæ. These are formed by the agglomeration of small tubercles and the condensation, in consequence, of the interposed pulmonary tissue and of an irregular coat of lymph, and in part also by the induration of pulmonary tissue, in consequence of the irritation excited by the tubercle in its stage of softening. When the vomica is first formed, by the expulsion of the tuberculous matter, its inner surface is soft and rugged; after a time this becomes smoother, and something like a membrane forms on it, which occasionally pours out a puriform fluid, but which after a while becomes hard and semi-cartilaginous. The walls of the cavities are supplied by their own vessels, and grow and secrete matter into their cavities by the aid of these vessels. When these cavities approach to the pleural surface of the lung, there is often a coating of lymph or false membrane on the pleura at the part, which either thickens it or unites it by adhesions to the costal pleura. But if there be no such deposit or adhesion, and the pleura should give way and be perforated, then the contents of the cavity and the air from the bronchia pass into the pleural sac, constituting pneumothorax and pleuritic inflammation.

The tuberculous cavities or vomicæ are traversed by parenchymatous shreds and sometimes by bloodvessels, but which last are rarely eroded or destroyed. When they are suddenly opened in this way

hemoptysis even of a fatal nature is sometimes the consequence. At other times again the vessels may be completely obliterated. The bronchial tubes open into the cavities generally by destructive ulceration. The matter contained in the cavities consists of a mixture of pus, mucus, tuberculous matter, and serosity, tinged or mixed with blood; and even occasionally portions of the pulmonary parenchyma, which at times may be brought up by expectoration.

The situation of tuberculous cavities in the lungs, in a great majority of cases, is at the summit or upper lobes, whence they invade gradually the lower ones as the disease advances. Their size varies greatly, from that of a pea to being large enough to contain a pint or more of fluid. Sometimes the whole of the upper lobe is converted into a cavity of this kind.

I had intended to speak next of the causes of tuberculous formation or of pulmonary consumption, but believe that you will be better able to appreciate the value of opinions on this subject after my having noticed the chief, I will not say all the accompanying lesions of tissue in other organs. You will perhaps inquire first, whether this peculiar morbid and so generally incurable structure can be removed, or, in other words, is consumption curable? The weight of observation is in favour of the affirmative answer to this question. Laennec has shown, as the result of personal observation, that cicatrisation or healing of a tubercle has taken place. M. Andral declares that he has seen several cases of this healing of tubercles; and adds, that it may take place in various degrees. The interior of a cavity being completely emptied of pus, its walls are lined by a cellulo-vascular membrane. After a while this cavity disappears, and we meet with nothing but a simple cellulo-fibrous line at which abut abruptly large bronchia; or, there may be a larger mass of cellulo-fibrous or of calcareous or cartilaginous structure at which abut the bronchia. This is commonly the appearance of things at the apex of the lungs, which is shrunk, puckered, and adherent to the pleura costalis; and which, in its shrinking, leaves between it and the pleura a space that is afterwards occupied by a cartilaginous tissue of new formation. Such, says M. Andral, are the changes which take place in subjects who, after having exhibited all the symptoms of phthisis pulmonalis, have been cured, and afterwards died of some other disease. Dr. Carswell believes in the curableness of tuberculous disease, and points to the indurated matter, like chalk or hard mortar, found in the bronchial glands, as proofs that the tuberculous growth and transformation going on in these parts have been arrested. Simultaneous with these is often the irritation and tuberculous transformation of lymphatic glands in the neck, in scrofula, which are evidently often arrested, and the patient is left for a term of years in tolerable health. He has seen children who had tabes mesenterica entirely recover, and when examined after a lapse of years, and some of them in an adult state, having died from other diseases, hard, dry, chalky masses were found in the mesenteric glands. Dr. Williams (*op. cit.*) mentions the healing, by contraction in size, of tuberculous cavities; but he adds, that they are

scarcely ever quite empty: they contain more or less of a pale-coloured, plaster-like matter, which consists chiefly of carbonate and phosphate of lime, and sometimes contains earthy concretions. "The contraction is evident from the puckering of the pulmonary tissue visible on the pleural surface near the cavity, and the adjoining vesicles are generally dilated to fill up the space. The cretaceous matter is probably secreted by the fibrous false membrane (which lined the cavity of the tubercle); but it may have been originally of the character of tubercle or pus, and being unable to escape, the animal part has been absorbed, and the earthy insoluble salts are left behind and accumulate from successive depositions."

In some cases of tuberculous disease we see the patients cough up chalk-like concretions, which are an evidence of the chronic nature of the disease, and of the restorative efforts of the parts to oppose farther degeneration. It is worthy of remark, that both the softening during the elimination of tubercle and its induration, in the process just mentioned, begin in the centre.

Lesions in other Parts of the Respiratory Apparatus. — I omitted to indicate, when describing the changes which accompany pulmonary tubercle, the other alterations taking place in the lungs themselves. These are emphysema and œdema of various extent and degree, and inflammation of the lung around the tubercles. This last may present the three degrees of acute pneumonia. Chronic pneumonia is quite common around the tubercles, either during their stage of crudity or that of softening. The question, to be answered presently, comes up in view of this conjunction of pneumonia with tubercle; is the inflammation of the lung the cause of this tubercle?

The *larynx and trachea* are quite frequently the seats of inflammation and ulceration in phthisis, a fact of which you are already apprised in my Lecture (IX.) on chronic laryngitis. It stated, that "of one hundred and two consumptive patients noted by Louis, the trachea was found to be ulcerated in thirty-one, the larynx in twenty-two, and the epiglottis in eighteen." The ulcerations of the *larynx* are chiefly seated at the insertion of the vocal cords, — in these latter themselves, especially at their posterior part, at the base of the arytenoid cartilages, upper part of the larynx, and interior of the ventricles. Sometimes one or more of the vocal chords is destroyed entirely. The *epiglottis* suffers from ulcerations, sometimes without any corresponding affection of the larynx or trachea. Their situation is generally at the laryngeal surface of the epiglottis, and commonly at its inferior portion.

The trachea is chiefly ulcerated at its lower and posterior part, and here, also, the redness of the mucous membrane is most manifest. Occasionally the cartilages are denuded and even destroyed by ulceration. Small, round, hard tumours are seen beneath the mucous membrane of the larynx and trachea, which have been called tubercles, and which, after a while, give rise to irritation and ulcerative inflammation. These are regarded by M. Andral as diseased follicles (*Clinique Medicale*). By M. Louis, as by Broussais before him, the inflammation and ulceration of the trachea

are attributed to the irritation of pus and tuberculous matter, in its passage from the bronchia during expectoration.

The pleura is diseased by adhesive inflammation in a vast majority of cases of pulmonary tubercle. Of 112 cases of this disease, examined by M. Louis himself, there was but one in which both lungs were free from adhesions. These are, generally speaking, in number and extent proportionate to the pulmonary disease. Pleurisy is common during the last period of existence in phthisical subjects; and terminates in the formation of false membrane, serous effusion, and even sometimes true pus.

Tuberculous degeneration of the bronchial glands is common enough in pulmonary tubercles of children, but much less so in that of adults. In the latter there may be tubercles of these ganglions without a trace of pulmonary phthisis (*Clinique Medicale*).

Associated disease of the *circulating apparatus* is every now and then met with in phthisis. The heart is rarely hypertrophied: the opposite state, or that of atrophy, is more common. Sometimes the heart is soft and flaccid; and at other times it is firmer than natural. When the ventricles are of diminished thickness, this is more commonly found in the left than in the right ventricle. The aorta, for the most part healthy, is sometimes found in a morbid state, which is manifested by a redness of varying intensity and extent. At its bifurcation we sometimes see cartilaginous laminæ, ulcerations, and osseous points. Often it is contracted in its diameter.

The *spleen* was found, by M. Louis, to be augmented in size sixteen times and diminished fifteen times, and in its normal condition fifty-nine times. It is often found tuberculous, especially in children.

The variety of seats of disease associated with that going on in the lungs, is well summed up by Dr. Williams. "Tuberculous disease in the mesenteric and other lymphatic glands, spleen, liver, brain, ovaries, and other parts, and tubercle combined with induration, or some low form of organized structure in the serous membranes, the pleura, peritoneum, membranes of the brain, &c.; inflammation and ulceration, probably proceeding from tuberculous deposits in various parts of the intestinal mucous membranes; chronic inflammation of the joints, and brown softening of their synovial membranes; diseased nutrition of the interosseous ligaments; greasy degeneration of the liver; and general wasting of all the tissues."

Most constant and remarkable of all the lesions of other remote organs, associated with tuberculous disease of the lungs, are those of the digestive canal. M. Louis reaches the conclusion that they occur in four-fifths of phthisical subjects. The pharynx and esophagus, except sometimes a thinness and softening of the inferior portion of the latter, are healthy. The stomach is variously altered, in its being sometimes greatly augmented in volume, and more frequently in its mucous membranes being thinner than natural, softened, and even destroyed, or, on the contrary, thicker than in health.

It may also be of a lively red colour, and the seat of ulceration. The common seat of softening is at the upper part of the great curvature. The change of tissue in this case may occupy nearly the whole surface of the stomach, or it may be displayed in the form of bands. Sometimes projecting bodies are seen on the mucous membranes, of a rounded form, one or two lines in diameter, resembling fleshy granulations or wounds. Ulcerations of the stomach were observed by M. Louis in a twelfth of the cases of consumption. M. Andral (*op. cit.*) records, as the result of his observations in the *Charité*, that at least three-fifths of the persons who died from phthisis exhibited a well-marked morbid condition of the stomach.

The *duodenum* was generally found by M. Louis to be in a normal state. Out of sixty cases he only saw three of ulceration of this organ. Very different was the state of things in the small intestine proper, the mucous membrane of which was softened, thickened, and more or less red, and exhibited in addition small abscesses, tubercles, and ulcerations. Tubercles in every stage of development are met with in the entire track of the small intestine, but much more frequently near the cæcum. They were observed by M. Louis to be present in 36 out of 95 cases. Ulcerations were still more frequent, having been met with in 78 out of 95 subjects, and also most numerous and deep as we approach the cæcum. The coat of the intestine has been found to be entirely perforated. In the large intestine the morbid changes in the redness, softening, and thickening of its mucous membrane, and the frequency of ulcerations and tubercles are similar to those in the small intestine. Fistula *in ano* was hardly ever met with by M. Louis or by M. Andral.

The *mesenteric glands* were found to be tuberculous and enlarged 23 times out of 102 subjects of phthisis. The meso-cæcal, meso-colic, and lumbar glands, exhibited similar changes. In 8 of 80 cases, the lymphatic glands of the neck were tuberculous. The axillary glands have been almost always in a normal state.

In the secreting apparatus, alterations of tissue have been met with in consumptive subjects. Thus, the cellular tissue sometimes exhibits tubercles; the arachnoid and pia mater show false membranes, serosity on the upper surface of the arachnoid, and redness, thickening, and injection of the pia mater. The peritoneum in a fifth part of the cases has a serous effusion, and occasionally false membranes, pus, and adhesions. Ascites is only met with when there is complication of heart disease with phthisis.

The *liver* is morbidly affected by what is called fatty transformation, which reaches the entire substance of the organ. M. Louis has met with this in 40 cases out of 120, or one in every three. The figure of the liver is normal, but its volume is almost always augmented, and especially at its great lobe. We find on these occasions that the liver covers almost entirely the anterior surface of the stomach, fills the epigastrium, goes beyond the false ribs, and reaches as far as the spleen and crista of the ilium. Its consist-

ence is commonly altered; it is soft, and tears easily. This fatty transformation of the liver is confined almost entirely to phthisis pulmonalis; and it is found to be much more frequent among women than among men. It occurs when the disease is of short as it does when it is of long duration. Sometimes the liver is the seat also of tubercles, hydatids, cysts, &c. In general, the bile in subjects in whom this fatty transformation of the liver has taken place is of a dark colour and pitchy consistence. In one case only has M. Andral met with tuberculous formation in the gall-bladder and biliary ducts. The pancreas has always been found healthy. Seldom are the kidneys altered in phthisis. The same remark applies to the bladder. The muscles are generally atrophied in the phthisical; and the proportion of phosphate of lime in their bones is less. M. Dupuy has observed that cows affected with pulmonary tubercle secreted milk which contained an unusual quantity of this salt.

After this summary view of the seats of tuberculous disease, we shall be prepared to accord in opinion with Dr. Williams, when he says: "If tubercle be, as we suppose, a degraded condition of the fibrin or nutrient principle of the blood, we may expect it to be deposited wherever the nutrition or the secreting process is carried on — wherever lymph or pus is occasionally found — wherever, in short, bloodvessels run. Instead of being, as supposed by Dr. Carswell, most commonly deposited on free mucous surfaces, its appearances on them is less usual, and bears the small proportion of the liability of these surfaces to plastic inflammations. Lymph is sometimes, but rarely, secreted by mucous membranes; and it is about as common to find tuberculous matter, or a degenerated fibrin akin to it, in the air-tubes or cells, when the coats of these are entire. It is more common on the serous membranes; but it is much more usually (but not as Lombard maintains, exclusively) deposited on the interstitial cellular texture of organs, especially those which are highly vascular, and in which blood is apt to stagnate and accumulate."

LECTURE LXXIII.

DR. BELL.

CAUSES OF PHTHISIS PULMONALIS.—*External Causes*—Climate—Difference of mortality in different countries—Consumption, a common disease in the Mediterranean climates,—also in the West Indies, and in the islands of the Indian Ocean—Consumption varies in its rate of mortality in different periods—*Close and impure air a common cause*—Effects of dust given out in certain trades—Deficient or improper food—Internal causes of consumption—Age—Sex—Hereditary predisposition—Conformation of the chest—Influence of inflammation of the respiratory organs—Tubercle may be formed without inflammation—Conditions for this—Consumption a constitutional disease—*Progress, duration*, and *termination* of phthisis.

CAUSES OF PHTHISIS PULMONALIS. — These are external to the individual and internal. Of the former, *climate* is entitled to be

first considered. Within a few years a great many important facts have been collected on this subject, and opinion is undergoing a change respecting the sanative properties attributed to certain climates in the cure of consumption. This disease is met with in every region of the earth; but it is less common in extreme northern latitudes than elsewhere. The deaths from it in the region between the fiftieth and sixtieth degree of north latitude, are only 53 in 1000 from other diseases. Between 45 and 50° N. the disease augments in frequency. Thus, in 1000 deaths, in Vienna, 114 are from consumption; in Munich, 107; in Berlin, 71; in London, 236. In Paris, a fifth of the deaths is from this disease. From 45 to 35° N. lat. the mortality is still considerable. In Marseilles, consumption carries off a fourth of those who die; in Nice, with its boasted climate for phthisical patients, a seventh; in Genoa, a sixth; at Naples, an eighth: in Milan and in Rome, so comparatively distant from each other and so differently situated, the deaths are a twentieth of the whole number. M. Journé, referred to by M. Louis, says that the Roman hospitals furnish as many cases of tuberculous disease as those of Paris. In Philadelphia, the deaths from consumption are on an average of four years (1834, 1835, 1836, and 1838), in proportion to those from all diseases, as 1 to 7·60: in Boston, the proportion is as 1 to 5½ in a period of twenty years (Shattuck — *Vital Statistics of Boston*); and in New York, 1 to 5·45. In this last mentioned city the mortality from consumption is increased excessively by the deaths among the European part of the population; the proportionate mortality among whom, alone from consumption, is 1 in 3·25, which, if deducted from the whole in New York, would leave for the native population à rate of 1 death in 7·66 deaths. (See *Remarks on Bills of Mortality of New York*, by Dr. Lee, Am. Journ. Med. Scien., vol. xxii.) The mortality is greater among the coloured people, from this disease.

Consumption is common enough at Madrid, Lisbon, Gibraltar, Malta, and the Levant; in fine, it commits no small ravages along the whole European shores of the Mediterranean, whereas, on the African side, it is represented, but how truly I know not, to be quite unknown.

The climate of the Mediterranean and of Southern Europe generally, does not merit the reputation which it has hitherto, or until recently, enjoyed for the cure of consumption. On the contrary, it excites with singular and alarming rapidity the tubercular diathesis into actual disease, by promoting the development and softening of tubercle. Dr. Sinclair, one of the surgeons to the British fleet in the Mediterranean, during the long war between France and England, bore strong testimony to this fact, as far as the crews of the vessels of his nation were concerned. Pursuing a course directly in contrast with what would have been thought advisable by his professional brethren at home, he advised the speedy return of the sailors to England, as soon as the critical symptoms of consumption were manifest, as presenting the only prospect of

saving the lives of these persons. It was found, on comparison of equal numbers in the fleet in the North Sea and in that in the Mediterranean during a winter, that there were fewer cases of consumption among the former, notwithstanding their exposure to a most inclement season, than among the latter with a so much more genial temperature. In Malta and Gibraltar the cases of consumption among the British troops in garrison, on an average of twenty years, are as numerous in proportion as they are in Great Britain among the same class of persons, viz., 6 *per annum* in every 1000 men. In the Ionian Islands the proportion is 5 in 1000 (Major Tulloch's *Statistical Reports, &c.*, p. 35[a]). Throughout all England the deaths by this disease were, in 1837, 3·96, and in 1838, 3·93, in 1000. Equally prevalent and destructive in most of the Mediterranean stations are catarrhal affections and inflammations of the lungs. In the document just referred to, it is stated that this class of diseases is "nearly twice as prevalent as among the same number of troops in the United Kingdom; and that in the mild climate of Malta they are nearly twice as fatal." Bearing directly on our present subject is the following remark: — "These facts, combined with a careful examination of the Abstracts in the Appendix, lead to the inference that residence in the Mediterranean, though so often recommended to patients labouring under pulmonary affections, is by no means likely to be attended with beneficial results: in some cases, no doubt, change of air, change of scene, and the sea-voyage, may have benefited a patient, and led to a partial recovery; but the same would in all probability have taken place wherever he had been sent, it being by no means likely that any beneficial influence can be exerted by the climate itself, when a body of selected soldiers, subject to no severe duty, and exposed to no hardship, lose annually a larger proportion of their number by consumption than in the United Kingdom. This inference, however adverse to generally received opinions, is strikingly corroborated by the prevalence of consumption and other pulmonary affections among the civil inhabitants of Malta, — as shown in Appendix III. of this Report." On referring to this Appendix I find it stated that, during a period of thirteen years, with an average population of 100,270 persons, the deaths from all diseases in Malta were 33,501; and of these, 6664 were from pulmonary diseases. Consumption alone numbered of the deaths 4149, or 1 in 8 of the whole number of deaths, — a rate nearly as high as that of Philadelphia, including all classes of her population, — natives white and coloured, and foreigners. In all England the deaths from this disease in 1838 were, in the whole number from all diseases, as 1 to 5·55. A scarcely more favourable representation of the climatic influence of the whole Mediterranean coast can be made than that of the insular posts. The mortality at Naples is, as we have seen, the same as at Malta. Dr. Young declared consumption to be as common a disease in Marseilles as in London; and Smollet, who wrote it is true as a querulous invalid might be supposed to do, declared, nearly a century

ago, the climate of Provence to be anything but favourable to the consumptive invalid. No physician at the present day at all conversant of the facts in the literature of the subject, will be found to speak of Montpelier in the terms of eulogy once so commonly applied to it as a residence for the consumptive. Phthisis is quite common there, and the physicians of the place do not hesitate to direct their patients to a more genial location.

If we look still further south, but yet short of the tropical latitudes, for a home for the consumptive, our embarrassments are not removed; for we find phthisis prevailing at Madeira and the Canaries, as it does in the southern portion of our own country, particularly among the coloured part of its population, in connexion with if not dependent on a scrofulous diathesis. In the Southern States the complication of intestinal disease is more common, and ulcerations and tubercles of the bowels, added to those of the lungs, cause the disease to go through its course with sometimes fearful rapidity.

Great is the surprise or still manifest incredulity of many persons, who have learned for the first time, through the Reports of Major Tulloch, that consumption is a common disease in the West Indies. But if their inquiries had led them as mine did in preparing, some twenty years ago, lectures on general pathology, including of course the influence of climate, they would have ascertained this fact from other sources. Among these was the testimony borne by Dr. John Hunter (*Observations on the Diseases of the Army in Jamaica*); as when he tells us, that "pulmonary consumption rarely originates in the island, but those who come from England with that complaint already begun, are not benefited by the warmth of the climate; on the contrary, the disease is precipitated, and proves fatal sooner than it would have done in a more temperate air. Of this we have repeated examples among the soldiers, several of whom arrived on the island with beginning consumptions, and were all quickly carried off by that disease." Hillary (*Observations on the Changes of Air, &c., in the Island of Barbadoes*) speaks frequently of peripneumonia and pleurisy prevailing among the inhabitants of the island. More direct and express is the information on the subject communicated by Dr. Colin Chisholm, whose long residence in the West Indies, and chiefly in Grenada, enabled him to speak with knowledge. He declares consumption to be a quite common disease in these islands, and that the chief difference between the disease there and in England is the greater rapidity of its progress to a fatal termination in the tropical than the northern islands. Pneumonia also, he tells us, occupies a distinguished place during the spring and winter months among the tropical endemics (*A Manual of the Climates and Diseases of Tropical Countries, &c.*). The deaths in an aggregate strength of 86,661 British soldiers during a period of nineteen years, on the Windward and Leeward Islands, was 6803; of which 906, or 1 in 7·5, were from pulmonary diseases, and 580, or rather more than 1 in 12, from pul-

monary consumption. Among the black troops the deaths from pulmonary diseases were 676; the whole number being 1646 in an aggregate strength of 40,934 for nineteen years, or 1 death in about 2·60. The cases of deaths from consumption were 390, or 1 in 4 of the deaths from all other causes. Major Tulloch, after pointing out the very small mortality among the officers in the West Indies from pulmonary consumption, which contrasts so strongly with the number of deaths among the soldiers, thinks that there is some other cause than climate operative in the production of consumption among these latter. He indicates as a probable cause confinement to close and illy-ventilated barracks; but the difference in this respect between the lodging of the officer and the men is not so constant and marked as to explain the difficulty.

On the opposite side of the earth, but still in a tropical region, and in an insular position too, one deemed peculiarly favourable to the procuring of an equable and mild temperature, I refer now to Mauritius, an island in the Indian Ocean, consumption is a common disease. From diseases of the lungs, 5·6 per 1000 die annually, or twice as many as at the Cape of Good Hope. This excess arises from the comparative prevalence of consumption, to which more than one-half of the mortality from this class is due, and with which $7\frac{7}{10}$ of the mean strength is attacked annually; a higher proportion than in the United Kingdom or the Mediterranean.

Dr. Forry (*The Climate of the United States and its Endemic Influences*) has impugned the accuracy of the basis of the British Army Reports, on the ground that their authors have assumed England as the standard of comparison to test the relative salubrity of other countries in regard to pulmonary diseases, and have adopted a classification of climates based on mere latitude. As Englishmen, describing the mortality among English troops in English possessions, and drawing entirely from English documents, and addressing themselves to the English authorities and public, with reference to the probable benefit that might be derived by the inhabitants of England from their visiting the countries referred to in the tables, for the amelioration or cure of consumption, it is not easy to see what other standard of comparison could have been used with any advantage to the parties for and respecting whom the estimates were made, than the one which was actually adopted. In perusing the introductory remarks to the tabular returns, and the summary and deductions which follow, I do not find any attempt at systematic climatology, such as that attributed to them by Dr. Forry. The chief peculiarities of the climate of the Windward and Leeward Command in the West Indies are first described, and then those which are characteristic of each island are subsequently detailed. It was hardly necessary for Major Tulloch to speak of the mean temperatures of winter and of summer in addition to the mean of the whole year, when we learn from him that the difference between the highest and lowest mean range of the thermometer is, even in the most variable of the islands, only 13°, and in some it is

not more than 4° throughout the year; whereas, he adds, in Britain it is in most years upwards of 30°. The only notable division of seasons in the Windward and Leeward Islands, into two wet and two dry, and the large quantity of rain in the former, is that one which he mentions. Other peculiarities, such as prevailing winds, hurricanes, electrical phenomena, and limited range of the barometer, are also specified. Dr. Forry in his strictures, says, "Now it has been demonstrated by the statistics of the United States Army that, in the climates in which the extremes of temperature are moderated, in which there is little difference between the mean temperature of winter and summer, pulmonary diseases as a class exhibit a low ratio." The reply to this is, that in the West Indies generally in which these climatic conditions are fulfilled, pulmonary diseases as a class exhibit a *high* ratio; and, in reference to pulmonary consumption, it may be added, that where the very opposite of the favourable conditions specified by Dr. Forry exist, viz., in high northern latitudes, and extreme systems of winter and summer climates, this disease is comparatively infrequent.

The strictures of Dr. Forry on the error of comparing the highest average in one command with the lowest in another, and in the oversight of bad habits and bad morals operating on the British soldier, as well as the progressively deteriorating influence of prolonged high heat, have a better foundation than the preceding ones. An invalid visiting any of the West India Islands, and spending a winter or its equivalent season there, need not be subjected to any of these influences. As relates to the Mediterranean climates, the remarks of Dr. Forry must not be overlooked, on the necessity of separating, in our inquiry, the two systems of summer and of winter climate, by the latter of which an invalid from the north with chronic pulmonary disease may be benefited, while by the former he will be most probably injured.

Tuberculous disease is, on the other hand, readily developed in a native of a warm climate who passes into a cold northern one. Negroes coming into northern latitudes suffer in this way. It has been frequently observed that monkeys and other animals, natives of tropical regions, are soon attacked with enlargement of the lymphatic and bronchial glands, and tuberculisation of these bodies, after coming into a cold climate; and the more readily when pent up in cages and dens, and deprived of exercise.

The influence of seasons, which, like winter and summer, may be said to represent atmospherical extremes, as spring and autumn do atmospherical vicissitudes, is felt in the development and aggravation of consumption. In temperate latitudes so called, winter and spring are most favourable to producing these effects. In southern countries summer and autumn are most detrimental.

Consumption declines for a period in the frequency of its attacks and consequent mortality. In England, from 1790 to 1800, the disease increased, proportionately, to a considerable extent; then diminished, and afterwards increased again from 1818 to 1823,

since when, it is alleged, that it is once more abating. In Boston there has been a marked progressive diminution as designated in three periods, 1811 to 1820; 1821 to 1830; and 1831 to 1839; the ratio being, respectively, 223, 3, 179, and 141·7. (Shattuck, *op. cit.*)

A moist and cold air favours the coming on of tuberculous disease; and hence living on a sea-coast, with an easterly marine exposure, is particularly injurious. Less inconvenience is felt with a western and southern exposure, which is rather deemed to be sanative, and to offer the patient the best prospect for restoration to health.

Impurity of the air, owing to deficient ventilation and the exhalations from men and animals crowded together, is particularly detrimental, and must, in connection with deficient food, be regarded as the most powerfully predisposing and sustaining cause of pulmonary consumption. Illustrations of this fact on a large scale have been furnished in the Annual Reports of the Registrar-General in England during the last few years. In the second Report, or that for 1838–9, we learn that the average deaths throughout the country, from all diseases of the respiratory organs, are ·605 *per cent.*, and from phthisis ·393 *per cent.*; but in London the deaths from the diseases of the respiratory organs generally are ·783 *per cent.*, and from phthisis ·414 *per cent.* In Cheshire and Lancashire, manufacturing counties, and with a population to the square mile greater than any other part of England except London, deaths from the first mentioned diseases show ·783 *per cent.*, and from the latter ·509 *per cent.* The increase of deaths by consumption in cities over those in counties or the country is 39 *per cent.* The influence of a confined and vitiated atmosphere is shown in a remarkable manner, says Sir James Clark (*Cyclop. Pract. Med.*), by the fork-grinders confined in the town of Sheffield, and those employed in the same occupation in the country. The former die between the ages of twenty-eight and thirty-two; the latter generally attain the age of forty. In both cases the exposure to mechanical irritation is the same, and the habits of the grinders in and out of Sheffield do not differ; but the rooms in which the country workmen carry on their occupation are much better ventilated. A similar cause, confinement in close apartments, operates on domestic animals. All the milch cows in Paris became tuberculous after a certain period of confinement in the house.

The operation of different trades and other employments towards the production of pulmonary tubercle, has obtained considerable attention from industrious and competent observers; but there is not that accordance of result among them that could be desired in order to inspire us with the necessary confidence in drawing conclusions. It is generally conceded that all they who, in addition to breathing a close and badly renewed air, work in a constrained posture, particularly if it be stooping or bending constantly, are prone to consumption; but the danger is greatly increased if fine particles of metal, stone, or wood, are given off in the processes

of manufacturing, and inhaled by the person at work. On this part of the subject we are indebted to the writings of Benôiston-Chateauneuf, Lombard, and Thackrah.

Deficient or improper food contributes its share towards the production of pulmonary tubercle; whether it consist of crude vegetable or damaged animal matter. Whenever it falls short of furnishing an adequate amount of chyle it does not meet the wants of the economy, which suffers in consequence and is liable in consequence to depraved and morbid secretions of various kinds. Food in excess, or of a kind too exciting for the digestive organs, may also induce tubercular cachexia, in the opinion of Sir James Clark (*op. cit.*) — a circumstance which he believes is not sufficiently attended to, — we may say not generally understood even by medical men: nevertheless, he adds, we hold this to be a frequent cause of scrofula, and believe that it produces the same effects on the system as a deficient supply; the imperfect digestion and assimilation in the one case and the inadequate nourishment in the other, being equally injurious; the form and general characters which the disease assumes may differ, but the ultimate results will be the same in both cases. His closing remark, in the following paragraph, applies unhappily, with peculiar force to a great majority of the children in the United States, where animal food is so abundant, and eaten beyond measure by all ages and both sexes. "The adaptation of the food, both in quality and quantity, to the age of the individual, as well as to the powers of the digestive organs, is too little considered; and the evil consequences of this neglect are often evident in the children of the wealthy classes of society, who are frequently allowed an unrestricted use of the most exciting kinds of animal food."

M. Andral very properly expresses his disbelief in vegetable aliment having the deleterious influence attributed to it in the production of consumption. If monkeys, Guinea-pigs, rabbits, cows, &c., which we keep shut up in menageries or stables and pens become tuberculous, we must attribute this result less to the kind of the nourishment which they take than to the defect of exercise and pure air. Lions and tigers whose food is exclusively animal, suffer in the same way by their becoming also tuberculous. The food of the inhabitants of London is more decidedly animal than that of any people of Europe, if we except perhaps the inhabitants of Geneva, (*Bell on Regimen and Longevity,*) and yet phthisis pulmonalis is more common in the English capital than anywhere else.

Internal Causes of Consumption, or those inherent in the individual. — *Temperament* of a particular kind is said to constitute a predisposition to tubercular disease; and hence the lymphatic and the strumous are represented to be peculiarly liable to this disease. Persons who have suffered from scrofula in childhood are predisposed to phthisis in adult life, and even still more during the prevalence of the scrofulous disease itself. Let us not, however, infer that persons thus constituted are the sole, or of necessity, consumptive,

for phthisis attacks also those of a sanguine, bilious, or nervous temperament. In general, as M. Andral has remarked, phthisis is of frequent occurrence among individuals who have light or chesnut hair, and a fine and white skin; although we see it also in those with very black hair. Of 298 children, from 2 to 15 years of age, who died of phthisis, there were 74 with brown, 130 with chesnut, and 115 with fair hair. The sclerotica was in general very thin and of a bluish tint, and allowed the choroid to be seen beneath. Most of those children had long eyelashes. We infer from these details that no temperament is exempt from pulmonary consumption, but that the lymphatic predisposes to it in a greater degree.

Age. — Medical opinion has been for the most part coincident with that of Hippocrates, which declares pulmonary consumption to prevail chiefly between the ages of 18 and 35 years. Some have even thought that it could not show itself beyond this period. Modern inquiries have considerably modified this opinion; and we know now that pulmonary tubercles will attack all ages; and they have even been found in the fœtus *in utero*. They are not of frequent occurrence in the early period of life; in the first year they are very rarely met with, and but seldom in the second. From this time their frequency augments yearly, until between 9 and 11 years, at which period they become less common. Of 338 tuberculous persons of the age of from 2 to 15 years, the maximum of frequency was found to be from three and a half to seven years. Another augmentation was found between 12 and 13 years, and the minimum between 2 and 3 years. In a list of 223 phthisical adult patients, observed by MM. Bayle and Louis, the following were the proportionate ages at which they died, viz.: from 15 to 20 years, 21; from 20 to 30, 62; from 30 to 40, 56; from 40 to 50, 44; from 50 to 60, 27; and from 60 to 70, 13. M. Lombard has collected a table of 9549 phthisical patients whose deaths occurred in the following periods, in a descending series: from 20 to 30 years; 30 to 40; 10 to 20; 40 to 50; 50 to 60; from birth to 10 years; from 60 to 70; from 70 to 80; from 80 to 90. The general inferences from these and other tables of the same kind, although collected under different circumstances of time, place, &c., agree in showing the greatest number of deaths to occur between the age of twenty and that of thirty; the next in proportion between thirty and forty; the next, as commonly believed, between forty and fifty; but we must perhaps admit anterior to this the period of ten to twenty years.

Sex. — Tubercular consumption is common to both sexes; but seems to commit its greatest ravages among females. In a table consisting of 9549 cases of this disease, there were 5589 women and 3960 men. Bayle, M. Louis, and M. Papavoine, have arrived at similar results in their inquiries. Quite different, however, are those of calculations on this subject made in other places. Thus, at Hamburg, Rouen Hospital, Naples, New York

Hospital, at Geneva, Berlin, and in Sweden by one estimate, the deaths from consumption among males and females were in the ratio of 10 to 8·6: while, by another table in Sweden, the excess is slightly against the females, the proportions being as 10 to 10·4; and by another table also in Berlin, they are as 10 males to 11·6 females; and in a third table of boys and girls, the proportions are as 10 of the former to 15·6 of the latter. In England, the deaths from consumption are most numerous among females, being to those among males in the proportion of 19·2 *per cent.* to 16·0 *per cent.* This is the more worthy of notice, as the mortality of males throughout the kingdom was in the same period seven *per cent.* higher than in males. Mr. Farr attributes the higher mortality of English women by consumption partly to the in-door life which they lead, and partly to the compression preventing the expansion of the chest by costume. M. Louis, on the other hand, does not believe that this undoubtedly unhealthy fashion of dress can explain the greater mortality of women by consumption. It deserves to be noticed, says M. Andral, that the men most subject to phthisis are they whose temperament approaches nearest to that of women. The young persons among whom phthisis counts its most numerous victims are tall and thin, and whose growth has been rapid; and who, with a narrowness of the chest, exhibit a delicate skin and complexion, and red and projecting cheeks.

Hereditary Predisposition. — The hereditariness of pulmonary tubercle is generally admitted by medical observers, and the fact cannot well be questioned. A child born of consumptive parents, or whose father or mother is phthisical, brings with it at birth, not tubercles, but a predisposition to their formation, which medicine, or rather rational hygiene, may sometimes combat successfully. On the point, from which of the parents the child is most apt to inherit this morbid tendency, observers are not agreed. It has been remarked, however, and correctly, that the more a child resembles in external lineaments one or other parent, the more certainly will it inherit the diseases of that parent. Sir James Clark judiciously observes on this subject, that there are several diseases besides the tuberculous which may so deteriorate the health of the parent, as to produce a state of cachexia, which will give rise to a scrofulous constitution in the offspring. Of all diseases he regards dyspepsia as the most fertile source of cachexia of every form, for this plain reason, — that a healthy condition of the digestive organs and a proper performance of their functions are essential to the due preparation of the food, and consequently to the supply of healthy nourishment to the body. Sometimes phthisis passes over, as it were, one generation to attack the next succeeding; as when a person dies of consumption, yet his children escape and his grandchildren fall victims to the disease.

Conformation of the Chest. — A narrow and compressed thorax has great effect in developing pulmonary tubercles: it is the one so commonly exhibited by phthisical patients.

Influence of Inflammation of the Respiratory Organs. — At one time the belief was almost general, that inflammation of some of the pulmonary tissues preceded and gave rise to consumption. Bayle taught the very opposite opinion to this, in which he has been followed by Laennec and Louis: it is, that tubercle is a growth *sui generis*, totally independent of inflammation, although it may be complicated with this latter. M. Andral, with his usual accuracy of observation and cautious judgment, which prevent him from giving into extreme opinions, believes that, in a great majority of the cases in which tubercles have seized on the pulmonary parenchyma, their development has been preceded by symptoms of sanguineous congestion. He points out the circumstance of the symptoms of phthisis following an attack of pneumonia in a person who had previously enjoyed good health. Now as we have no proof of the prior existence, in these cases, of tubercles in the lungs anterior to acute inflammation of the latter, and as, on the other hand, we see in many instances that tubercles are developed by inflamed tissues, being as it were secreted in place of pus, as in the false membranes of the serous membranes, and as M. Andral has again and again seen in patients of inflamed cellular tissue, why should we not admit that pneumonia produced the tubercles in question? Do we not, every now and then, discover in a lung that is completely hepatised tuberculous granules, in a nascent state, disseminated through its parenchyma. It would not be correct to regard these tubercles as a cause adequate to produce such intense pneumonia. Similar reasoning applies to the occurrence of phthisis after hemoptysis and bronchitis. In general, hemoptysis is an evidence merely and an effect of tuberculous irritation; but can we suppose this to be the case in robust individuals who have lived in the plenitude of health until they have had hemoptysis which was followed by the symptoms of consumption? It is not probable that tubercles should have existed so slight as not to cause even cough, and yet all at once acquire such irritative force as to produce copious hemorrhage from the lungs. Pulmonary apoplexy, associated as it often is with hemoptysis, has been known to give rise to tubercles, since they have been found in different parts of the congested and impacted lung. As regards protracted catarrhal or bronchial irritation, we have both direct facts and analogy to assure us that tubercles actually latent are developed by its persistence.

A modified and, as it seems to me, correct and physiological view is taken of this subject by Dr. Williams (*op. cit.*). He regards tubercle as a morbid secretion, a product of imperfect inflammation, perhaps we ought to say of inflammation of deteriorated and imperfectly vitiated tissues, which bears an analogy to lymph and pus. The diffused tuberculisation or infiltration of the lung from inflammation presents generally a matter in this transition state. It is neither good organisable lymph, nor is it wholly unorganised tubercle; and the albuminous effusions on serous and

mucous surfaces not unfrequently present such an intermediate state that it is difficult to determine to what class they most belong. Dr. Williams then repeats what he has before stated with regard to the inflammatory secretions of mucous and serous membranes, viz.., that *lymph, pus, and tubercle, pass by imperceptible gradations into each other.*

He gives so good a summary of the classes of cases in which inflammation and irritation complicate and hasten tuberculous development, that I shall repeat it in his own words, without attempting to abbreviate it by any paraphrase.

"In the first class of cases we have the development of phthisis from local inflammation, without any evidence of prior constitutional disorder, unless an hereditary predisposition, which may be traced in some of these cases, may be considered as such. The acute inflammation, whether pulmonic, pleuritic, or perhaps bronchial, imperfectly treated and only partially subsided, passes into a chronic form, and either immediately developes phthisical indurations in the lungs, or by lowering the vital powers generally, leads to their formation from perverted nutrition, or from the irritation of any fresh exciting cause. Under any of these circumstances, chronic inflammation, either by its own local effects, or by its depressing influence on the constitution, or by both combined, becomes a sufficient cause of pulmonary consumption: and, as you may suppose, consumptive disease originating in this way, is sometimes more limited in its extent, and manageable in its course, than that first arising from a constitutional disorder. As the cause is more local, so the lesion is more confined to a part; and we see instances of it in the very partial indurations or tuberculous depositions which we frequently meet with in the lungs of elderly persons who die of other complaints. In at least half the instances in which I have thoroughly examined the lungs of persons in London and in Paris, above the age of forty, without reference to the disease which caused their death, I have found some traces of those lesions which, occurring in greater extent, constitute phthisical disease. You can very easily discover these by passing the lungs quickly between your fingers, and when you feel a hard body, on cutting into it, it will be found to be either a grey induration or a yellow tubercle, or the remains of one; whilst nothing in the rest of the body betokens any scrofulous taint. Yet the same local causes that produced these solitary tubercles, may engender many; and the greater the number that the local cause thus developes, the more effect will it have on the constitution, which becomes in a manner inoculated by it. Hence, therefore, also, out of a local cause, such as a latent or neglected pneumonia, pleurisy, or peritonitis, may arise a general tuberculous disease, involving, more or less, the whole system. Among the local causes of consumption are to be reckoned, also, the habitual inhalation of fine solid particles, which is contingent on certain occupations, such as those of needle-pointers, dry grinders, stone-masons, miners, colliers, and the like. The dependence of the lesions, in these cases, on the mechanical irritation of the inhaled par-

ticles, is sufficiently proved by the presence of these particles in the indurated lung, which in the case of colliers is completely blackened by them. With these cases may be associated those of phthisis, produced in the experiments of Saunders, Cruveilhier, and others, in the lungs of animals, by the injection of mercury into the air-tubes, or into the bloodvessels."

But, and herein consists the strong points of the position of Bayle, Laennec, and Louis, there are circumstances under which tuberculous matter is sometimes deposited in tissues and on surfaces bearing no marks of inflammation or other disease. This brings us to a direct inquiry into the immediate cause of tubercle, apart as nearly as may be from extrinsic or modifying causes. It is one of interest, and is so well expressed by Dr. Williams, that I shall use his own language on the occasion.

"The structures thus affected are commonly those either very vascular naturally, or peculiarly subject to congestion of blood, such as the bronchial glands, the lungs of children, the spleen of monkeys, &c.; and viewing tuberculous matter as a deposit of unhealthy fibrin from the blood, we see a reason, as Dr. Carswell observes, why it is most likely to be found in those organs where the blood accumulates or passes slowly. Whatever may be the cause which determines the deposition of tuberculous matter in these cases, we know the pus also is sometimes secreted in parts unaffected with inflammation, as in the purulent deposits in the viscera after great surgical operations; and in the profuse discharges of matter from the bronchial membrane, which is found after death to be paler than usual; nay, pus has been occasionally found in the centre of fibrinous coagula in the heart, when no purulent matter could be discovered elsewhere in the body. So, likewise, tuberculous matter has been met with in the blood itself, within coagula in the spleen and in the heart, and in fibrinous concretions within the bloodvessels. This circumstance tends to show that the fibrinous portions of the blood are liable to be converted into tubercle, independently of any action of the vessels; they lose their vitality, and may in proportion be merely deposited in tissues, or on surfaces without the presence of any irritation. We are thus again, as in the case of the grey indurations, led to trace to the condition of the blood the cause of consumptive disease of the lung; and it is probably a diseased state of this fluid that constitutes what is called the tuberculous or scrofulous diathesis, in which there is a tendency by vessels in different degrees of activity to deposit tubercle instead of lymph: and when this diseased state exists to a great extent, the tuberculous matter is excreted from the blood without any increased vascular action, but merely as an accompaniment of the natural secretion of a membrane, or instead of the ordinary nutrient deposit of a tissue; and thus it may be either an external or an interstitial deposit. Whatever in such cases determines the first deposition of tubercle in a tissue, will with greater facility affect its growth by the addition of a similar matter to a ready formed nucleus. The tendency to the deposit of yellow tubercle, independently of irritation, im-

plies a condition of the blood even more depraved than that which leads, under the same circumstance, to the formation of the chronic indurations; it is an ulterior degradation of the fibrinous nutriment of the tissues, replacing them by a matter not merely inapt in texture and of lower vitality, but wholly destitute of life, and of the principle of organisation. When, therefore, tuberculous matter is found in an uninflamed tissue, it may be looked on as a sign of a most decided constitutional taint. In such conditions of the system, tuberculous depositions may take place with great rapidity; and as they are already almost ripe for elimination, the ulceration and destruction of the lung will soon follow; but nothing can give development to tuberculous disease with such fearful speed as the occurrence of acute inflammation in the pulmonary tissue. It is from this process in a highly tuberculous constitution, I believe, that the general tuberculous consolidation, called infiltrated tubercle, takes place. The matter deposited is often rather a mixture, or intermediate state, of lymph and tubercle, one product predominating in one part, the other in another; but it is altogether beyond the reach of the sorbefacient remedies which avail in pneumonia to promote the absorption of simple lymph; and if it do not destroy life by its solid interference with the function of the lung, it speedily runs in many points into softening and suppuration, and the patient is carried off by a *galloping* consumption. In this case the lungs are found more or less solidified, and on incision incipient cavities are seen almost in every part; but there is no induration; the most solids parts have scarcely more substance than a hepatized lung, and they even more readily break down under the fingers."

The constitutional nature of phthisis and the causes of deterioration of the nutritive and reparative functions are described by Dr. Williams, as follows:—

"In the second and third class of cases, which are unfortunately the most numerous, the disease is certainly constitutional; and the cachectic condition of the system, as well as the circumstances that seem to occasion it, fully correspond with the pathological views which we have taken of the origin of tubercle. Imperfect nutrition, whether from deficient or improper food, or from a permanently disordered state of the digestive or assimilative organs; unhealthy air, whether from closeness, humidity, or impurities; long continued exposure to cold (as from insufficient clothing), not intense enough to produce inflammation; depressing passions, such as disappointed love, anxiety or distress from reverses of fortune, or other severe calamity; venereal excesses; profuse and very weakening discharges; adynamic fevers; irregularities of the uterine function, especially those that lead to chlorosis; the sudden suppression of habitual discharges, or of long-established cutaneous eruptions,—these, singly or combined, are the most common causes of the constitutional origin of tuberculous matter; they all tend to destroy the balance of the functions, and diminish the tone of the system, and with it that rich fibrinous and vital condition of the blood, by which proper nutrition and the organic functions are sustained. The impoverished

blood, defective in that vital albumen with which the tissues are fed and renewed, deposits in its stead a degraded matter, imperfectly or not at all organizable, like that resulting from the lower degrees of local irritation or inflammation. The lungs, the lymphatic glands, and a few other organs, become the first seat of these deposits, because their textures are in freer relation with the blood than those of other parts are; and if there be in these organs also a congestion, an irritation, or an inflammation, the deposition becomes more extensive and rapid in proportion, although, if the inflammation be acute, it may also produce organizable lymph, together with the degraded albumen, tubercle. And mark how the natural activity of the nutritive process will determine the rapidity of the tuberculous deposition, and the progress of the disease. In young persons nutrition is most active; so is consumption spontaneous and rapid; and at no period is this more manifest than between the ages of eighteen and twenty-five, when growth becomes completed, yet the vessels and their blood do not immediately lose their habit of deposition. But throughout the whole period of childhood and youth tuberculous disease is very common, and is more easily engendered than when nutrition is less active, under the influence of the causes which I have enumerated. You can understand, too, why this morbid nutritive activity, this disposition to deposit albuminous matter (in such cases inorganic, tuberculous), should be shown in women after the completion of utero-gestation, and in persons on the speedy healing of large suppurating wounds — circumstances which, as long as they continue, are known often to suspend the progress of consumptive disease."

Duration of Phthisis. — Pulmonary consumption has always been regarded as a chronic disease, and, in fact, in a majority of the cases its progress is slow and gradual. But, at times, the disease assumes an acute form, and reaches its fatal termination with great rapidity. Occasionally, again, we find it pursuing a very irregular course, and exhibiting periods of remission of more or less duration and distinctness. A knowledge of this last fact will not a little guide us in our prognosis and treatment; as we may every now and then meet with cases in which a suspension of all the unpleasant and sinister symptoms might be regarded as a cure, when, in reality, the disease soon recurs with violence and terminates fatally. It is under such circumstances that percussion and auscultation are of great service in making us acquainted with the real state of things. Laennec believed, and M. Louis joins him in opinion, that the renewal of the disease after a remission is owing to a fresh crop of tubercles, at a time when those which caused the first series of symptoms have reached an advanced stage. These attacks were called by Laennec *secondary* consumption.

M. Louis (*op. cit.*), in remarking that the symptoms of phthisis generally augment in violence as the disease advances, tells us, what indeed is obvious enough to an observer of the progress and complication of phthisis, that hemoptysis is an exception; also that its intensity is in the inverse proportion with the advance of the

original or tubercular disease. Pregnancy is commonly believed to retard the progress of consumption; an opinion on which M. Louis confesses his inability to decide. But it is more generally admitted, that after delivery the disease advances with increased rapidity to a fatal termination. All febrile attacks produce similar results. Many cases are on record showing that after an attack of pneumonia, or of typhoid fever, measles, etc., phthisis which up to that time had been chronic assumed a most acute character.

The *duration* of phthisis is very variable. We sometimes see patients carried off in a month, and others live twenty years, although labouring all the time under confirmed consumption. Age seems to exert little influence on its duration, but it is not so with sex. Women in general sink under the disease more rapidly than men, which, as M. Louis suggests (*op. cit.*), may be owing to the fatty degeneration of the liver, and more profound lesions of the mucous membranes of the stomach in the former than the latter.

The *termination* of phthisis is generally by gradual wasting away of the system and exhaustion of the vital powers, owing to the progress of destructive alterations in the lungs and secondary lesions in other organs. At other times, the termination is owing to perforation of the lungs, or of the small intestines, tuberculous meningitis, &c. In some rare cases death is brought about by a terrific hemoptysis, which, like traumatic hemorrhage, destroy almost immediately. Œdema of the glottis may sometimes accompany ulcerations of the larynx, and bring on suddenly fatal termination.

LECTURE LXXIV.

Pulmonary Tubercle—Combination and enumeration of signs—Signs of bronchial irritation—depending on their situation and combination—Signs of irritation of the parenchyma—Difficulty of diagnosis—Feebleness of respiration an important sign,—interrupted respiration—Signs of irritation of the serous membrane—Friction sound rare—Slight dulness of one clavicle—a difference on the ridges of the scapula—Clavicular dulness and feebleness of respiration—Condensation, how detected—General dulness—General acute development of tubercle—Diagnosis depending on development of tubercle—Tubercular dulness.

Tubercle of the Lung. — In conformity with my plan at this time, I shall confine myself solely to the diagnosis and treatment of phthisis, and only discuss the pathology of tubercle incidentally, and so far as may be necessary for the elucidation of the subject.

The diagnosis in this affection is drawn from the study of the former and actually existing symptoms, *considered in relation to the physical signs and their mutations.* It is to be recollected that there are no physical signs peculiar to tubercle; it is in their combinations, situation, successive changes, and connexion with pure symptoms, that they have their value.

It is not to be denied, that a correct diagnosis of phthisis may be frequently made without the aid of physical signs, for there are

abundant cases presenting such a combination of circumstances as to render the existence of tubercle all but certain: these are the more obvious, ordinary, and advanced cases. But in the earlier periods, when the diagnosis is practically useful, and in that vast category of cases in no respect corresponding to the description of books, the symptomatologist is continually at fault. We shall not enter, therefore, into a detailed account of symptoms, for it would be a hopeless task to frame any description which would apply even to the majority of cases; but, after having examined the sources of the physical signs, we shall combine and study the symptoms and signs of the more prominent varieties of the disease.

As in phthisis all the structures of the lung may be engaged, so in a single case we may meet every known auscultatory sign of disease of the mucous membrane, parenchyma, and serous investment. These occur in infinitely various combinations, according to the degree of irritation, the number of tissues engaged, the extent of ulceration, and the chronicity of the disease.

I have shown on a former occasion (Lecture LVI.), how comparison aids us in physical diagnosis, and there is no disease in which it is so applicable as phthisis. In this respect an important division may be made of those cases, on the one hand, in which comparison subserves to diagnosis; and those in which the phenomena being similar and universal, the principle is inapplicable. In the first class, or that in which the disease is originally local, may be placed by far the greater number of cases: for those in which the disease engages the whole lung in a nearly equable manner are exceedingly rare.

For example, the existence of tubercle of the upper portion of one lung is recognised by the difference between its physical signs and that of the lower lobe; in other words, by applying comparison. And in like manner, if the whole of one lung be diseased, we recognise the lesion by comparing it with the other. But when tubercle is scattered equably throughout both lungs, and accompanied everywhere by the same amount of irritation, then the diagnosis becomes difficult indeed, and can only be arrived at by successive observations.

Let us now enumerate the physical signs of pulmonary phthisis:

1st. *Signs of irritation.*
   a. Of the mucous membrane.
   b. Of the air-cells, or parenchyma.
   c. Of the serous membrane.
2d. *Signs of solidification.*
3d. *Signs of ulceration.*
4th. *Signs of atrophy.*
5th. *Signs referrible to the circulating system.*
   a. Action of the heart.
   b. Of the arteries.
   c. Displacement of the heart.

I shall examine these sources of diagnosis separately.

Signs of Bronchial Irritation.—In the great majority of cases these proceed and accompany the development of tubercle, and the *râles* (rhonchi) occur in every degree of intensity and variety of combination. In some a single occasional mucous bubble is the only sign, while in others the respiration is altogether masked by a combination of the sonorous, sibilous, and muco-crepitating *râles*. These signs are audible under the clavicle, in the axilla, or in the acromial or supra-spinous regions; in some cases accompanying the ordinary breathing, in others only audible *on a forced inspiration;* and thus it commonly happens that the signs escape the superficial observer — for the murmur may be pure during ordinary breathing, and yet intense bronchial *râles* be revealed by a forced expansion. To Dr. Forbes is due the great merit of first pointing out the importance of investigating the respiration in the earliest stages of phthisis — a subject which Laennec comparatively neglected.

Of these *râles* the most common are the mucous and muco-crepitating; next in frequency are the sibilous, while the rarest are the deep-toned sonorous *râles*. These results we might expect from the tuberculous irritation first engaging the minute air-tubes. Connected with this we find that although these phenomena may exist simultaneously in the subclavicular, axillary, and postero-superior portions, yet that their existence in one of these situations does not imply that we can detect them in the others. The utility of this rule in examination is obvious, but in most cases we may content ourselves with exploring the anterior and posterior faces of the lung.

Combined with the direct signs of bronchial irritation, we find in most cases a feebleness of the vesicular murmur, and a shade of dulness of the clavicle or spinous ridge. The less musical the *râle*, the greater the probability that these signs shall accompany it; but we may have a loud musical *râle*, or scattered mucous bubbles, with clearness of sound, and even a puerile respiration.

Now, if it be asked what gives these signs of bronchitis their value as diagnostics of incipient tubercle, the answer is, that it is not by their mere characters, (for these do not differ from ordinary bronchitis,) but it is from their situation, localization, and combination with comparative dulness of sound, that they derive this value. The same phenomona, scattered over or even existing intensely throughout the lung, but being equable and unaccompanied by dulness, would not only have no value in the diagnosis of phthisis, but would render the existence of tubercle improbable.

Simple bronchitis is seldom circumscribed, while that of the consumptive is commonly so; the latter begins in the upper portion of the lung, remains obstinately fixed in the air-tubes, gradually spreads downwards, and while in its first stages in the lower lobe, is combined with tuberculous ulceration in the upper; it may be intense in the upper lobe while the lower is altogether free, or engage the whole of one lung while the other is scarcely affected. These are not the characters of ordinary bronchitis.

These observations apply to the ordinary cases in which the tubercle and bronchial irritation are at first local, and advance together, but the whole lung may be simultaneously and equably tuberculated, when of course these principles do not apply. The cases may be divided into two classes — the acute and chronic. As these cases shall be hereafter considered, I shall now allude to them only in connection with bronchitis.

In the first or acute form, a patient, previously in good health, is suddenly attacked with the most violent symptoms; there is high fever, extreme dyspnœa, lividity, and tenacious expectoration. In the early periods the chest sounds clear, but the signs of the most intense bronchitis, affecting the tubes of all diameters, are universally audible. The symptoms and signs continue with unabated violence, and after a few days *the whole chest presents a certain degree of dulness.* The patient dies from the violence of the pulmonary inflammation, and on dissection every bronchial tube is found inflamed, and the lung equably and closely studded with the miliary and granular tubercles. In the second or chronic case, the lung becomes, as in the former, equally tuberculated, but with a much lower degree of bronchial irritation; the disease goes on for a long period; the bronchial signs scarcely predominate in any one part of the lung, but are accompanied by general and sometimes decided dulness.

When the upper lobe contains a sufficient quantity of tubercle to give dulness of sound, a large mucous or muco-crepitating *râle* is often observable over the lower portions; and hence we commonly find that, while cavities or anfractuosities exist superiorly, the signs of bronchitis alone are to be observed below: and I have often been led to the discovery of tubercle in the upper lobe, by this lurking bronchitis confined to the lower portion of a single lung.

Signs of Irritation of the Parenchyma. — It is sometimes difficult to distinguish between these and the preceding signs. The crepitating *râles*, feebleness of respiration, and dulness of sound, may be enumerated as the phenomena of this class; yet of these the first alone can be properly said to indicate parenchymatous inflammation; the second may be explained on other principles; and the third has characters very different from that in simple pneumonia.

But the crepitating *râle* of pneumonia is rarely observed in phthisis, and I have never heard it unless on a forced inspiration; it is then accompanied with a degree of dulness; unlike the *râle* of pneumonia, it hardly ever disappears, to be replaced by bronchial respiration, but passes imperceptibly from the finest crepitus to the gurgling of anfractuosities.

Even when acute pneumonia of the lower lobe succeeds to chronic phthisis, the crepitation continues much longer than in the ordinary disease.

There is in phthisis a remarkable character of the crepitating and finer muco-crepitating *râles*, which must be noticed; these signs

may occur in a very circumscribed portion of the lung, and after existing twenty-four or forty-eight hours, disappear, but again to return in about the same time; and they may thus recur and subside many times in the course of a few weeks. I look upon this recurrent crepitus as an excellent diagnostic in many obscure cases; and in one, although the place of its first appearance was not in the superior portion, yet it satisfied me that tubercle existed, and dissection verified the opinion.

Lastly, we find that local depletion frequently removes these finer *râles* (rhonchi) for a time, and this is almost always accompanied by diminution or removal of the hectic, and a general relief. When on the treatment of phthisis, I shall return to this subject.

Let us now examine the important sign of *feebleness of respiration.*

Of the different signs of incipient phthisis there is none more important than this; it is to be ascertained by comparison of the corresponding portions of the lungs, and of the upper with the lower lobes — the observation being made on the forced as well as the ordinary respiration.

I have found that in many individuals there is a natural difference between the intensity of the murmur in either lung; and in such cases, with scarcely an exception, the murmur of the left is distinctly louder than that of the right lung. This character is particularly evident in females and nervous individuals, and has not been noticed by Laennec. It is of the greatest importance to bear it in mind, as we may thus be often relieved from the anxiety which such a discovery might produce. The following circumstances serve to distinguish this natural feebleness of respiration: —

1st. Its occurrence in the right lung.

2d. Its being unaccompanied by *râle* (rhonchi) or dulness of sound on percussion.

3d. Its being the same over the whole lung, and not confined to the upper portion merely, as in incipient phthisis.

It need scarcely be added, that the value of feebleness of respiration is greater when it occurs in the left than the right lung.

So many causes concur to produce morbid feebleness of respiration, that it is difficult to explain it by a reference to any one of them. All the pathologic states of the lung in incipient phthisis tend to this result. The bronchial irritation, the adhesive obliteration of the minute tubes, and the deposition of tubercle, would all produce a feeble respiratory murmur. Of these, however, the second cause is probably the most important; and the fact of feebleness of respiration occurring at so early a period, is what we might expect from the obliteration of a certain number of minute tubes before the air-cells had been filled up, or the intervening tissue consolidated. (See M. Reynaud's Memoir on Obliteration of the Minute Bronchial Tubes, Mémoires de l'Académie Royale de Médecine, tom. iv., 1835. The paper is translated in the Dublin Journal of Medical Science, vol. vii.)

But there is a feebleness of respiration which is difficult of explanation, and which seems to result from a spastic state of the lung. The following is a remarkable instance of this: —

A boy, aged twelve years, after recovering from a succession of eruptive fevers, by which he was greatly reduced, became suddenly affected with glandular swellings on the right side of the neck. These increased rapidly; the whole chain of lymphatic glands, from the clavicle to the mastoid process, became enlarged and indurated, causing considerable deformity. In little more than a fortnight, however, the tumours had nearly disappeared, when he was attacked with a violent cough, difficulty of breathing, and acceleration of pulse. I saw him on the third day of this new illness; all traces of the glandular swellings had subsided, the breathing was hurried, and the cough dry. *Both sides of the chest sounded perfectly well; but while the respiration was loud over the left lung and lower half of the right, it was totally absent over the whole right upper lobe.* Bleeding from the arm was performed, and the axilla was freely leeched; and, on the next day, the respiratory murmur had returned with nearly its natural intensity. The lymphatic swellings now began to reappear, and in less than a week had attained their former magnitude, the chest being completely relieved. Iodine was now used both externally and internally. For upwards of two weeks the tumours resisted the remedy, when they suddenly began to disappear, and in three days nothing was left but a slight induration above the clavicle. Cough, pain, acceleration of breathing, and quickness of pulse, set in, and the respiration of the upper lobe became as before extinct, while it was intensely puerile in the other portions.

Leeching and blistering were employed on the affected portion; the symptoms were again removed, and again, in the course of a week, did the cervical swellings return. These of course were no longer interfered with, and by a steady perseverance in constitutional treatment the boy gradually recovered; but a year elapsed before the lymphatic tumours had disappeared.

In this important case we see the alternation of scrofulous action between the neck and upper portion of the right lung — for that the patient was twice on the point of passing into acute phthisis, no one can reasonably doubt.

But the nature of the feebleness of respiration remains to be ascertained. It occurred as the sole phenomenon; neither *râle* nor dulness accompanied it, and its subsidence under treatment was followed by the reappearance of lymphatic irritation of the neck. Was the obliteration of the tubes the result of inflammatory spasm, or a combination of this with the adhesive process?

In the ordinary cases, the feebleness of respiration is almost always modified, and often removed, by a timely antiphlogistic and revulsive treatment; and there can be no doubt that, in this way, many a patient can be saved from impending consumption.

Connected with this subject we may notice the interrupted respiration — "respiration entrecoupée" of Laennec — in which the inspiratory murmur is broken into a succession of efforts. It indicates the first stage of tubercular irritation, and may be removed by local treatment. As a diagnostic, however, it has no value, unless when it is local, and occurring in a case in which tubercle has been already recognised, when it becomes the *avant courier* of more unequivocal signs.

The interesting phenomenon of the contraction of the muscular fibres of the chest on percussion must be here noticed. "Some time ago, on percussing a patient who had laboured under a pectoral affection, with several symptoms indicative of tubercular development, we were surprised to observe that, after each stroke of the ends of the fingers, a number of little tumours appeared, answering exactly to the number and situation of the points of the fingers where they had struck the integuments of the chest. These, having continued visible for a few moments, subsided, but could be again made to appear on repeating the percussion. In this case percussion excited a good deal of pain; the situation in which those little tumours were most apparent was in the subclavicular region, and over the great pectoral muscle. Since this observation, we have seen the same phenomenon in a number of cases.

"How far this phenomenon may be connected with, or depending on, internal disease, is yet to be ascertained. It is seldom met with, unless in cases where the patients are emaciated to a certain degree. In these individuals we often find, on using percussion quickly and with some force, that after each blow a degree of pallor is observed in the parts struck, exactly answering to the points of the fingers; this is instantly succeeded by the return of redness, and the erection of a little tumour, which has often a slight quivering motion, and which subsides in the course of one or two seconds.

"We have observed this to occur most frequently in the superior and anterior portions of the chest, but have also met with it in other situations; such as the arms, back, &c. In some cases the patients complained much of pain on percussion, while in others they did not appear to suffer more than usual." — *Clinical Report of Cases in the Medical Wards of the Meath Hospital, during the session of* 1828 *and* 1829; *Dublin Hospital Reports*, vol. v.

There is nothing in this muscular irritability peculiar to phthisis, but that it is commonly connected with irritation of the lung, or pleura, there can be no doubt; and in this way, like the other signs of irritation, it becomes available in the diagnosis of phthisis. It is always more evident in the earlier periods; thus, in incipient phthisis it occurs over the primary seat of irritation, while in the confirmed and chronic cases we may often find it absent over the lung first diseased, and strikingly marked on the side last and least engaged.

Signs of Irritation of the Serous Membrane. — Although pleural adhesions so commonly attend pulmonary tubercle, yet the physical

signs of pleuritis are comparatively rare. I have never found them in the earlier periods, even when the signs of bronchial and parenchymatous irritation were manifest.

It is in the advanced stages, when the upper lobe contains ulcerated tubercle, that the "*frottement*" of Laennec is sometimes discovered in the mammary, lateral, or postero-inferior portions. It is most commonly ushered in by pain of the side, but continues long after this has disappeared; indeed, some of the most remarkable instances of the persistence of *frottement* (friction) may be seen in pulmonary phthisis, and the phenomenon may continue for several weeks without decided change.

It almost always exist with clearness of sound, and a perceptible murmur. The patient is frequently conscious of the rubbing, on drawing a deep inspiration — a sensation quite independent of pain. In the earlier periods, the sensation is communicated to the hand, but the sound may continue for weeks after the signs from touch have disappeared.

The same causes which produce the rarity of friction in pneumonia operate also in phthisis. There is a great similarity between the mode of adhesion in both cases, and the surfaces of the membrane may unite without the conditions which best induce the friction sound. The existence of the ordinary pains of the side in consumptive patients does not by any means imply that we can detect the friction signs. The nature of these pains is still obscure, but that injury is commonly done by treating them as if they arose from pleuritis in every case, there can be no doubt. May they not often be neuralgic, or analogous to cancerous pains?

If the phenomena of dry pleuritis be rare in phthisis, those of liquid effusion are still more so. The case of empyema with pneumothorax and fistula is of course excluded. The signs are the following: *rapid dulness of the lower portion, and absence of respiration, without the signs of progressive pneumonic solidity.* I have no observations to determine how far the previously tuberculated state of the upper lobe may modify the signs of displacement.

Signs of Solidification. — In phthisis, condensation of the lung occurs in two forms. In the first, it is complete; in the second, incomplete, or as it were interrupted. Of these the first is rare, the second extremely common; consequently the physical signs of *complete solidity* are rarely observed, and this constitutes an important difference between the signs of phthisis and pneumonia, or cancer of the lung.

Even in cases of the tubercular infiltration, inducing a homogeneous structure, complete solidity is seldom observed, in consequence of ulceration causing an anormal permeability.

A slight dulness of one clavicle or scapular ridge is one of the earliest signs, and can often be detected only by the most delicate comparative percussion. It may exist with or without stethoscopic signs, and in the earlier periods may vary to a certain degree. We may diminish, or for a time remove, the dulness of sound by treat-

ment, which proves that in the earlier stages it is owing more to the congestion or inflammation of the lung, than to the existence of tubercle.

As in the case of the bronchitic signs, we cannot infer the amount of existence of dulness of the posterior portion, from the examination of the anterior; or *vice versa*, both clavicles may sound equally well, yet a distinct difference be observed in the ridges of the scapula; and it is obvious that the reverse may happen. In a few cases the dulness begins at about the third rib anteriorly, or the sub-spinous region posteriorly, and spreads upwards; and, in a still rarer class, we have first dulness of the lower, and afterwards of the upper lobe; but in these cases the disease begins with pneumonia, a chronic hepatisation is produced, and the lung becomes slowly tuberculated from below upwards.

The clavicular dulness is almost always accompanied by a corresponding feebleness of respiration. But the reverse of this may occur, *and a tubercular dulness of the clavicle coincide with a puerile respiration.* This happens when the posterior half of the lung is greatly condensed, while the anterior remains permeable. As the disease advances, however, the apparent anomaly disappears.

In a few cases the dulness coincides with a bronchial or tracheal respiration. I have already shown why this sign is comparatively rare in phthisis; when it exists, however, it is always most distinct in the erect position, and may then be pure, or, what is more frequent, combined with the muco-crepitating or mucous *râles*. I have often found that the respiration was merely feeble, and without the slightest bronchial character, when the patient was lying down, but on his getting up the bronchial respiration became evident.

As in pneumonia, this appearance of the bronchial respiration proceeds from the greater expansion of the lung.

But the equal sonoriety of both clavicles may coexist with tubercle. It may arise from a small but equal quantity of tubercle in both lungs, or its predominance in one lung posteriorly. In the first case comparison must be instituted between the lower and upper lobes. Delicate and successive percussion of each rib from the sixth upwards must be performed, when the disease will be often discovered.

In doubtful cases, condensation can often be detected by the following manœuvre. Having noted the ordinary sound of the clavicle, we are to direct the patient to inspire deeply, and hold in his breath; from obvious reasons, percussion will now detect a difference of sound before imperceptible.

As disease advances, the dulness extending downwards may occupy the entire lung, but it rarely happens that the whole side is equally dull, the lower generally sounding clearer than the upper portions. General dulness of one side may, however, be met with; I have observed it from the following causes: —

First. General tuberculisation of the lung, the tubercles being in the crude or ulcerated condition.

Second. Pneumonic solidity of the lower lobe. In most cases, the pneumonia is the primary affection.

Third. Effusions into the pleura.

Fourth. Complication with enlarged liver. This only applies to the right side.

Fifth. General solidity, with great atrophy of the whole lung, causing contraction of the side.

Of these cases, the first is by far the most common ; that of unresolved pneumonia passing into tubercle, is next in frequency. The others are exceedingly rare. The dulness being established, is modified in two modes. In the first, ulcerous cavities forming in the lung diminish the dulness, although without restoring the natural sound. When the cavity is empty, the sound is somewhat tympanitic, and often accompanied by the *bruit de pot felé.* When it is large, the sound might be confounded with the natural resonance, but the stethoscope will at once detect the error. The second cause has been already mentioned under the head of Pneumonia. The distention of the stomach with air gives a peculiar resonance to the left lung ; and this false clearness, which can be dissipated by a carminative draught, is often made the ground of unfounded hope, and the source of bitter disappointment. It need hardly be observed, however, that to the experienced stethoscopist the mere character of the sound suffices to prevent error.

General acute Development of Tubercle. — Hitherto, we have studied the signs of solidification in their ordinary progress, the tubercle being at first localised, and gradually extending. But when the whole lung is equably and simultaneously tuberculated, the diagnosis by comparison becomes impossible. Here the diagnosis is drawn from the succession of physical signs ; the chest, as before stated, becomes dull without the usual signs of pneumonia and pleurisy, and in most cases with the phenomena of bronchitis merely. This principle will be elucidated when we discuss the symptoms of phthisis in connection with physical signs.

In the *general chronic tubercular development*, the facility of diagnosis depends mainly on the suppuration of the tubercle ; if it be nearly equally developed in both lungs, and still in the crude granular condition, the diagnosis is difficult ; this may be seen in the general cachexia, and in old persons. Bronchial *râles*, equally diffused, exist, and, from the emaciation of the patient, the dulness of sound may escape observation. These cases, too, being almost always of long duration, dilatation of the air-cells often occurs, the clearness of which compensates for the dulness of the tubercle. But when suppuration exists, the difficulties are removed, and we have either the signs of cavities in the upper portions, or a general mucous or muco-crepitating *râle*, at once distinguishable from that of mere bronchitis, by the general and extreme dulness which

accompanies it, for in this suppurative phthisis the dulness is always more decided than in the granular variety.

Let us now enumerate the different modes and circumstances of tubercular dulness: —

1st. Slight variable dulness of the clavicle or scapular ridge, occurring in the first stage, and influenced by treatment.

2d. Comparative permanent dulness of these situations.

3d. Both clavicles dull — one more so than the other.

4th. Both clavicles equally dull.

5th. The same, with respect to the scapular ridges.

6th. Right clavicle and left scapular ridge dull.

7th. Left clavicle and right scapular ridge dull.

8th. Dulness of the clavicle, the corresponding scapular ridge clear.

9th. Dulness of the scapular ridge, the corresponding clavicle sounding clear.

10th. Dulness most evident at the third rib anteriorly, and the sub-spinous or inter-scapular region posteriorly.

11th. Dulness of the whole upper lobe.

12th. Dulness of the whole lung, most evident superiorly.

13th. Dulness at the root of the lung, extending upwards.

14th. Dulness of the lower lobe proceeding upwards.

15th. Equal dulness of the whole lung, the opposite sounding clear.

16th. Equal dulness of one lung and of the opposite upper lobe.

17th. Comparative dulness, with feeble or interrupted respiration.

18th. The same, with mucous or muco-crepitating *râle*.

19th. The same, with semi-tracheal respiration.

20th. The same, with puerile respiration under one clavicle.

21st. Complete dulness of one lung, with the *râle* of anfractuosities.

22d. The same, with the usual signs of a well-defined cavity.

23d. Incomplete dulness, with the resonance, on percussion, of a cavity.

24th. Incomplete dulness in the upper lobe, from a large excavation; perfect dulness of the lower, from tubercular solidity.

25th. Incomplete dulness, varying with the quantity of fluid contained in an excavation.

26th. General but incomplete dulness of both lungs supervening on bronchitis, or with crepitating *râle* persisting to the fatal termination.

Other combinations may of course occur, but I have verified the connection between the above and tubercle in a great number of cases. Of these, the most interesting are the sixth and seventh, the twentieth and twenty-sixth cases. The dulness of a clavicle, and the opposite scapula, is one of the most interesting of the passive signs; it is by no means uncommon, and I have never observed it unless from tubercle.

LECTURE LXXV.

TUBERCLE OF THE LUNG (*continued*).—Signs of ulceration—Gradual transition from crepitating to muco-crepitating rhonchus—Cavernous respiration and pectoriloquism the most important signs—Diagnosis between metallic tinkling of a large cavity and pneumothorax with fistula—Signs from atrophy of the lung—Falling in of the chest without atrophy—Ascertained by measurement of the chest—Signs from the state of the circulating system; few in number—Increased action of the subclavian—Varieties of phthisis—Acute inflammatory tubercle without suppuration—General principle of diagnosis of this kind of tubercle—Acute suppurative phthisis—Hemoptysical variety.

SIGNS OF ULCERATION. — In most cases, the signs of irritation precede and pass into the phenomena described at the conclusion of the last lecture. In some, however, the latter appear at once, unpreceded by any active auscultatory sign.

In general, nothing can be more gradual than the transition from the crepitating to the muco-crepitating *râles*, from these to a large mucous rattle, which passes into the *râle* of anfractuosities, and ultimately the gurgling of a cavity. This is the ordinary course, and a cavity may thus form, *complete dulness having never existed.* In other cases, however, more or less of dulness having existed, the signs of excavation at once appear; this occurs from the softening of a large tubercle, or a mass of tubercular infiltration.

On the formation of a cavity in the upper portion, we may often detect smaller ulcerations, or the earlier stages of tubercle, in the lower part of the affected lung, and in the upper lobe of the opposite. So rarely, indeed, is tubercle confined to one lung, that the existence of a cavity almost certainly implies disease in the opposite side, even though no physical sign of it should exist.

The signs of an excavation vary according to its situation, size, contents, bronchial communication, and the condition of its walls. The principal are cavernous respiration, *râle*, and pectoriloquism; of these, the two first are by far the most important; for pectoriloquism, about which so much has been written, and on the discovery of which so much importance is placed, is, of all the physical signs of phthisis, the least constant, certain, or useful. If the ear be well accustomed to the cavernous respiration and cough, and to the gurgling *râles* of a cavity, the investigation of pectoriloquism may be safely neglected. Of the circumstances which modify cavernous respiration and *râle*, the most important is the state of the bronchial communication; the fewer and larger the tubes which open into the cavity, the better marked will the signs be, while the communication of a great number of smaller orifices obscures the cavernous respiration, and in place of gurgling, produces the intense mucous *râle* of a cavity, peculiar, indeed, but very different from the large cavernous *râle*. In a few cases, the temporary obstruction of the

tubes obscures the cavernous phenomena, which may be restored on the patient's coughing; and we thus explain the variation of the physical signs according to the position of the patient. Cases will occur in which the recumbent position obscures the signs of a cavity plainly evident when the patient sits up; the reverse of this is also observed.

The signs are rarely perceptible beyond the situation of the ulcer, and hence the removal of the stethoscope, for a single intercostal space, shall make us lose them. In the same way, a cavity may be plainly perceptible under the clavicle, and yet without the slightest indication of it posteriorly; nay, we may find a small excavation at the sternal end of the clavicle, while below the humeral the signs are wholly wanting.

When ulceration commences, it may be pointed out by a single but well-defined bubble, occurring in a situation with feeble or puerile respiration and some dulness. When this is constant, we may diagnosticate a cavity of the size of a Spanish nut. As new ulcerations form, the *râle* is multiplied, prevents bubbles of various sizes, and is heard over a greater extent. The sound is now more dull, and the respiration either very feeble or semi-tracheal, but cavernous respiration and pectoriloquism are absent, and we make the diagnosis of anfractuosities. At this period, the dulness is often very considerable, but the tracheal breathing is not in proportion to it. In some cases the *bruit de pot felé* exists.

A well-defined cavity being formed, with sufficient bronchial communication, cavernous respiration is produced. This must be explored during ordinary and forced breathing and cough. Upon cavernous respiration and gurgling depend the diagnosis of a cavity.

As yet we know little of the conditions which regulate pectoriloquism; but as a sign of phthisis, it has little value. Its occurrence in cavities of all kinds, ulcerous or not; its varieties; its similarity to morbid bronchophonia, often so great as to make it difficult or impossible to distinguish them; its existence as a natural phenomenon in the upper portions of the lungs of many individuals; and its total absence in cases presenting every apparent physical condition for its existence, have long made me consider it as the least important and most fallacious of all the physical signs of phthisis. Dr. Forbes has long come to similar conclusions. Taken alone, it is absolutely without value; but when in combination with other signs, it strengthens the diagnosis. It is to be explored during the ordinary and whispering voice.

In certain cases, the existence of strong pectoriloquism is perceptible to the patient, who, from the resonance of his voice, can point out the situation of the cavity.

When the cavity is close to the anterior surface of the lung, the agitations of its fluid contents are often perceptible before we apply the ear to the chest. In this way, sounds are produced by the respiration and the action of the heart. In the first case, the phenomena are twofold; we may have a distinct gurgling from many

bubbles, audible during inspiration and expiration — it is a sort of churning, or, which is more common, we hear a single bubble corresponding to the inspiration, and similar to the tick of a small clock, or watch. It has so happened, that all the cases in which I have observed this sign were fatal; it is the death-watch of the consumptive. In some cases, upon coughing, this is for a short time removed.

But a more curious phenomenon is the agitation produced by the action of the heart; it is the rarer of the two. Each pulsation is accompanied with a tick in the cavity, loud enough to enable us easily to reckon the pulse; this is not always audible without the stethoscope, but where the cavity is large, and the chest attenuated and elastic, we may hear it at a distance of a foot or more from the patient. In a case of the most protracted consumption, with extreme emaciation, this sound became painfully loud, and of a metallic character, on the patient opening the mouth.

This cardiac gurgling may occur in both lungs. I have heard it in the postero-superior portion of the right lung, while it is commonly absent even when the cavity lies upon the pericardium.

When the cavity becomes much enlarged, the metallic character may be communicated to the gurgling, cavernous respiration, and voice; of these, the metallic gurgling is more common, and the first perceived, for the bubbles will receive the metallic character from a cavity not yet sufficiently large to communicate it to the respiration or voice.

These characters are confined to the situation of the cavity, and hence, where cavernous respiration and gurgling exist under the clavicle, and over the scapula, yet with the metallic characters only audible in one situation, we way diagnosticate two or more cavities, one much larger than the others.

When a cavity exists in the lower portion of the left lung, the distention of the stomach with air may cause the phenomena to become metallic.

The diagnosis between the metallic phenomena of a large cavity, and those of pneumothorax with fistula, is not difficult. I shall arrange their characters in opposite pairs.

LARGE CAVITY WITHIN THE LUNG.	PNEUMOTHORAX, FISTULA, EMPYEMA.
1. Metallic phenomena much less developed.	1. Metallic phenomena intense.
2. Signs supervening gradually.	2. Phenomena suddenly developed.
3. Side not dilated. It may be contracted.	3. Side generally dilated.
4. Sound on percussion dull, or with the resonance of a cavity.	4. Percussion exactly indicating the extent of air and liquid.
5. No lateral displacement of the heart.	5. Lateral displacement common.
6. Cavernous *râle* large.	6. Cavernous *râle* absent.
7. Sound of fluctuation absent, or indistinct.	7. The reverse.
8. Pectoriloquism often present.	8. Pectoriloquism absent.

With respect to any of these characters, occasional exceptions may occur. In a case seen for the first time, we must never neglect percussion, mensuration, and the signs of cardiac or hepatic displacement.

The second character is almost always available; yet I have known of an instance where the *sudden development* of metallic signs did not proceed from pneumothorax.* The ordinary signs of a cavity had existed for some time, when, during a fit of coughing, the patient was seized with a sudden and violent pain in the side, and felt as if something had given way. The signs became metallic, and the patient soon afterwards sank; it was found that there had been two cavities divided only by a thin partition; this had been ruptured during the fit of coughing, and a cavity was thus produced sufficiently large to cause metallic sounds.

Laennec has given two cases of phthisical cavities producing metallic phenomena. In the first there was distinct pectoriloquism, and when the patient coughed or spoke, the tinkling was heard. The cavity occupied the upper half of the lung, and branched into many anfractuosities. It contained about two spoonsful of liquid.

In the second case there were also pectoriloquism and the metallic tinkling on coughing. A large cavity, containing a very little liquid, was diagnosticated. Three cavities were found communicating with one another, none of them larger than a pullet's egg. In neither of these cases did succussion produce any sound.

I have found the metallic signs in a few cases. In one, the patient had laboured under chronic phthisis of the right lung, when an extensive cavity rapidly formed in the left. The respiration was cavernous, and accompanied by a tinkling sound, similar to that produced by the falling of a pin into a cup of glass. A vast excavation was found in the upper portion of the left lung, communicating with many smaller ones by winding canals. In the lower lobe there was another cavity, of the size of a hen's egg. (See *Dublin Hospital Reports*, vol. iv., a Selection of Cases, &c.)

In another case, the left side sounded everywhere dull, while over the infero-lateral portion the metallic tinkling was audible after speaking, when a succession of metallic bubbles could be heard. This was not excited by the cough, nor was the voice itself metallic; there was no amphoric resonance nor sound upon succussion, nor was the heart displaced. The patient soon after sank, the tinkling having more than once subsided and reappeared, during the course of a few days.

We found the left lung universally adherent, and so excavated, as to resemble a bag of liquid more than a lung. Two large cavities existed, one in the upper, the other in the lower lobe; these

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* This case did not occur under my own observation, but has been communicated to me by a gentleman about whose accuracy there can be no question.

communicated by a fistula, into which the finger could be introduced. The upper cavity extended from the interlobular fissure to the summit of the lung; the lower could contain a middle-sized orange; both presented numerous anfractuosities, and the lower was nearly filled with a grumous, purulent fluid. They were both traversed by numerous vessels, lined with a strong cartilaginous membrane, and had the most extensive and free bronchial communication. In the upper cavity, particularly, the tubes seemed as if accurately cut across with a knife. The left lung contained a quantity of crude tubercle.

In a third case, the metallic tinkling occurred in the last stage of a chronic phthisis. Gurgling and cavernous respiration had existed over the left mammary region; but during the last fortnight of existence, an occasional metallic tinkling became audible. The cavity extended nearly from the apex of the lung to its base; it could contain more than a pint of fluid; its anterior wall was formed of little more than the pleura, and it was crossed by several obliterated bloodvessels. The remainder of the lung was nearly solid from tubercle, which also existed in small quantity in the upper portion of the right lung.

From these facts, it is obvious that the mechanism of the metallic signs is not yet established. These sounds may be intermittent, and may accompany the voice, inspiration, cough, and action of the heart, or exist in connection with only one of these actions; further, although they generally indicate a large cavity, yet even in this case they are not always present, and may even proceed from several moderately sized excavations, as in the case recorded by Laennec.

It is remarkable that in several of these cases the cavities were multilocular, the divisions being caused by septa of the pulmonary tissue, perforated by fistulæ, or by bands of obliterated vessels. Can this condition have any effect in producing the metallic sounds? I shall recur to this subject when on Pneumothorax, and in the mean time refer to the work of Dr. Williams, and the Memoir of M. Beau, *Archives Générales de Médecine*, tome iv., 11 serie, Mars, 1834.

Signs from Atrophy of the Lung. — That the volume of the lung is diminished in phthisis, was recognised by Bayle, but the subject has never been sufficiently studied. Laennec states, that a contraction of the chest may be observed in very chronic cases, when large cavities are tending to cicatrise.

Numerous observations, however, have convinced me, that the contraction of the chest, resulting from atrophy of the lung, begins, and may be appreciated, at a much earlier period than has been supposed; and further, that in chronic cases, great falling in of the chest may occur from interstitial atrophy, *without the formation of any cavity whatever*. Atrophy of the lung I believe always to attend the earlier stages of tubercle, and is probably produced by the operation of that law by which an organ loses its volume when

its functions are rendered less energetic; and thus, as the obliteration of the minute air-tubes described by Reynaud advances, the cells become useless, and ultimately disappear. An interesting illustration of this is recorded by Andral. In dissecting a monkey, M. Reynaud found that one bronchus was compressed by a large ganglion, so as greatly to diminish its calibre; the corresponding lung was singularly atrophied, and the side fallen in as in the absorption of pleuritic effusion. — *Precis d'Anatomie Pathologique.*

But whatever be the mechanism of the change, we can recognise it at an earlier period by accurate measurement of the antero-posterior diameter of the thorax, and in this way measurement is found a most important means of diagnosis in the earlier stages of phthisis. It should never be neglected. The best apparatus for making this measurement is a a pair of callipers moving on a graduated arc. By means of a spring callipers, one knob of which is fixed on the scapula, and the other below the clavicle, the comparative depths of the upper lobes can be at once determined, and the most minute difference detected. The circumference of the chest above the mamma, and the distance of the clavicle from the nipple, must also be observed. In the earlier stages, the difference varies from the eighth of an inch to half an inch, and there is no visible alteration, except a flattening or slight hollowing under the clavicle.

But in the more chronic cases, distinct deformity takes place. The antero-superior region becomes extensively flattened or concave, the shoulder depressed, the clavicle flattened, and its lower edge everted, the ribs closely approximated or even overlapping, and the apex of the scapula tilted out, as in contraction from empyema. The heart ascends in the thorax, and in one extreme case I have found it to pulsate under the second rib. All these signs are more connected with the chronic solidity than the suppuration of the lung, for the latter, by permitting some expansion to take place, may delay the process of contraction.

This condition may exist with complete dulness of sound and *bruit de pot felé*, but without the signs of cavities, or may coincide with gurgling and cavernous respiration in their different modifications.

Signs from the State of the Circulating System. — Active organic disease of the heart and aorta being among the rarest complications in phthisis, it happens that we can seldom avail ourselves of signs drawn from the circulating system; Louis found, out of a hundred and twelve cases, only three in which the heart was enlarged. It is more often diminished in volume, pale, and flabby, as if participating in the general muscular atrophy. This applies to the chronic cases, for in the acute I have often found the heart red, and in no way altered from its natural condition. The slowness with which the pulmonary obstruction occurs *in chronic cases*, explains the rarity of *morbus cordis;* for, as Louis has remarked, fluids diminish with the obstruction. — *Recherches sur le Phthisie Pulmonaire.* See also *Broussais, Histoire des Phlegmasies Chroniques*, tom. i.

Notwithstanding the atrophied state of the heart in phthisis, its action is occasionally violent and distressing. In most cases, indeed, its impulse is somewhat increased, and if there be emaciation, and much tubercle of the left lung, the impulse is distinctly double, the second stroke coinciding with the second sound.

In a few chronic apyrexial cases, the heart's action is perfectly tranquil, while in a still rarer class the palpitations are violent and irregular, so as to lead to the belief of great organic disease. Of this, Dr. Townsend has recorded a case, in which the symptoms were almost precisely those of morbus cordis; there were violent palpitations on exertion; a rapid, full, and bounding pulse; tremulous motion of the jugulars; extreme dyspnœa and orthopnœa; lips and nails of a dark leaden colour; and the heart's action so tumultuous as to cause the whole anterior surface of the chest to vibrate. The heart was found perfectly well proportioned; the foramen ovale not completely closed; both lungs were extensively tubercular with intercurrent pneumonia, which had been diagnosticated before death. —*Transactions of the Association of the King and Queen's College of Physicians*, vol. v.

How far the open state of the foramen ovale may have influenced the symptoms in this case, is still to be determined. I have seen a case of tuberculisation of both lungs, where the inter-ventricular septum was deficient, the aorta arising from both ventricles; the cardiac symptoms were severe, but there was no permanent cyanosis. The particulars of this case were communicated by Dr. Graves to Dr. Houston; the boy, aged three years, had had frequent attacks of bronchitis, and was admitted into hospital with signs of tubercular cavities and bronchitis; the heart's action was violent, the pulse feeble, and the skin cold. The face, hands, and feet, were of a dark, livid hue; *but it appeared that this colour was not habitual, and only came on when he laboured under pectoral affections.*

On dissection, besides the usual appearances of phthisis, the heart was found malformed; a well-defined opening, sufficiently large to admit the little finger, led from the right ventricle through the septum into the upper part of the left; this passage was twice as wide as that leading into the pulmonary artery; the left auricle was small, the right large; the left ventricle of the same size and thickness as the right; the aorta was unusually capacious; and the ductus arteriosus diminished in size, but not obliterated. — *Pathological Observations*, by John Houston, M.D. *Dublin Hospital Reports*, vol. v.

But one of the most interesting signs connected with the circulating system, is an increased action, often accompanied with *bruit de soufflet*, which, when the upper lobe is diseased, may be occasionally observed in the corresponding subclavian artery, and which has not been noticed by any author.

Two causes obviously exist for this increased action of the subclavian in phthisis; viz., the falling in of the subclavicular region,

and the consolidation of the lung; but I have little doubt that there is a third, namely, sympathetic irritation, something similar to the sympathy of contiguity of Hunter, for I have found that in certain cases it was distinctly remittent, its appearance coinciding with signs of pulmonary excitement and irritation; *I observed it to subside after a copious hemoptysis, and have repeatedly removed it by leeching the subclavicular or axillary regions;* and the fact of its being often accompanied by the bellows murmur, *inaudible in any other part of the circulatory system; and, like the pulsation, capable of being modified by the antiphlogistic treatment,* leaves little doubt of the correctness of my view. Under these circumstances, it occurs in cases with but little contraction or consolidation; and the bellows sound is often exceedingly sharp, though ceasing in the brachial artery, and altogether wanting in the heart, aorta, carotid, or opposite subclavian.

Varieties of Phthisis. — Under this head we shall study the symptoms, in connection with the physical signs of the more prominent varieties of the disease. The following cases may be enumerated:—

1st. Acute inflammatory tuberculisation of the lung without suppuration.

2d. Acute suppurative tuberculisation.

3d. Chronic progressive tubercle, with signs of local and general irritation; pulmonary ulceration.

4th. Chronic progressive ulceration succeeding to an unresolved pneumonia.

5th. Tuberculous ulceration succeeding to chronic bronchitis.

6th. Tubercle consequent on the absorption of an empyema.

7th. Chronic phthisis complicated with pneumothorax from fistula.

8th. Tubercle complicated with disease of the larynx.

9th. Latent progressive phthisis.

10th. Chronic latent but partial tuberculisation.

11th. Chronic general tuberculisation.

12th. Cicatrisation of cavities.

Acute Inflammatory Tubercle without Suppuration. — All the cases of this which I have seen, occurred as sequelæ or complications of the fever of this country. In most, the symptoms supervened after the fever, an interval existing between the crisis and the new attack. In others, the disease, commencing with the symptoms of the ordinary gastro-catarrhal fever, proceeded uninterruptedly to its fatal termination.

The symptoms are undistinguishable from the more violent forms of bronchitis. High inflammatory fever, with severe cough and extremely hurried respiration, sets in; the expectoration is scanty, viscid, and often tinged with blood; the face is swollen and livid, and the nares dilate; the action of the heart is violent, and the pulse extremely rapid; there are shooting pains in the side, and the patient has often copious sweatings and delirium. In some in-

stances, these symptoms are complicated with others referrible to the abdomen ; the tongue is dry and red, the abdomen swollen and tender, extreme thirst, drawing up of the knees, and diarrhœa. It is singular that in a case where these symptoms were best marked we found the gastro-intestinal tube healthy, while all the parenchymatous organs were filled with granular and miliary tubercles. In another instance, peritonitis from numerous perforations had occurred, yet the abdominal were nearly masked by the thoracic symptoms. — See *Transactions of the Association*, &c., vol. iv.; also the *Clinical Reports of the Meath Hospital, Dublin Hospital Reports*, vol. v.

In a second class, the symptoms are more pneumonic, while in a third, which may be termed the hemoptysical variety, the first symptom is a copious discharge of blood, followed by a rapid development of tubercle, but without the violent signs of irritation which occur in the two former instances.

In the two first cases the diagnosis is difficult, for the tubercle being often equably developed, comparison cannot be employed, and the want of the signs of ulceration adds to the difficulty. There is nothing characteristic in the symptoms, and the stethoscopic signs, taken alone, or considered without reference to time, are insufficient. In the first variety we have the most intense sonorous, sibilous, and muco-crepitating *râles ;* every part of the bronchial system seems engaged. In the second, the musical *râles* are comparatively wanting, while the crepitating and muco-crepitating are extensively audible ; yet, by successive observations, and considering the phenomena with reference to time, the diagnosis can be made.

I published the first instance of this diagnosis as far back as 1828. The case was one of a young female who became attacked with violent symptoms of gastro-catarrhal fever, which resisted all means of relief. The stethoscopic signs were of intense bronchitis ; yet we found that the chest became rapidly and extensively dull. This could only be explained on the supposition of an extensive crop of tubercle, which diagnosis was made at the time.

On dissection, both lungs were found completely stuffed with small granular and miliary tubercles, in such quantity as to obscure the condition of the intervening tissue, but they were generally crepitating, and nowhere presented complete solidity.

This progressive general though not complete dulness, consequent on the signs of bronchitis, has led me in many cases to announce the acute general development of tubercle.

In the second or pneumonic variety, the patient, though not suffering so much from dyspnœa, is in equal danger. The musical *râles* are either absent or very slight ; but an intense and extensive crepitating *râle* is to be heard. As in the former case, dulness advances, and the phenomena are only distinguishable from those of ordinary pneumonia by the absence of the signs of hepatisation. The *râle* continues to the end, and bronchial respiration is not observed.

The third or hemoptysical variety is never so rapid as the two former, and hence we can often avail ourselves of the signs of ulceration.

A remarkable feature in the inflammatory cases is the resistance of the symptoms and signs to treatment even of the most active and varied description. The disease seems to defy all medical treatment.

We may now state the general principle of diagnosis.

If in a case presenting the symptoms and signs of intense bronchitis, or if crepitating râle has been present, yet persisting to the last, we find the chest becoming dull; if this dulness be extensive, yet incomplete, without bronchial respiration, the stethoscope showing that the lung is everywhere permeable, the solidity only occurring in points; or if the crepitus be so slight as not to account for the dulness, we may make the diagnosis of the acute inflammatory development of tubercle.

Acute Suppurative Phthisis. — In the preceding variety, the absence of suppuration is owing not to any inherent character of the disease, but arises simply from the rapidity of the asphyxia. The cases now under consideration are those described by Louis as the acute phthisis; one case only of the first variety is given by him.

In this affection the symptoms set in as in the former case; they continue with great violence, and resist treatment. The expectoration soon becomes purulent; the fever is high, but after a time becomes a sort of mixture of the inflammatory and hectic forms.

The stethoscopic signs of the earlier stages are the same as in the last variety, but the deep-toned *râles* are not so often observed. After the tubercles suppurate, mucous *râles* passing into gurgling are heard. The musical *râles*, however, are not removed; a sibilous sound during inspiration and expiration is audible, and this, when the action of the heart is strong, is influenced by it so as to produce a distinct musical rhythm: of course, dulness rapidly advances.

In the cases given by Louis, death occurred in three, four, five, six, and seven weeks. I have seen two cases in which no pulmonary symptoms existed before the occurrence of fever, yet in which death occurred within three weeks from the first invasion, and the lungs were found full of tuberculous anfractuosities.

Louis remarks, that, notwithstanding its rapid development, this disease is accompanied by those secondary lesions which we see in the more chronic forms; ulcerations of the epiglottis, trachea, esophagus, and small intestine, have been observed. In one case, he found the mucous membrane of the stomach softened and thinned; in another, the liver was fatty; and, in a third, the lymphatic glands of the neck and mesentery contained tuberculous matter.

The diagnosis of this affection has been in part given by Louis. By combining his observations with mine, we may state it to be the following: —

If in a case which has presented violent and generally uncontrollable symptoms and signs of bronchitis, or of pneumonia continuing in its first stage; with a fever at first inflammatory, and afterwards passing into severe hectic, we find an extensive dulness to supervene, more partial, but more complete, than in the preceding form, accompanied with a large mucous râle, and supervening in a few weeks from the first invasion of the disease; we may diagnosticate the acute suppurative phthisis.

In the third or hemoptysical variety, the disease is not so rapid, nor are the signs of irritation at all so violent. There is sometimes an absence of *râle*, although the dulness seems as it were to grow daily, and advance downwards. The hemoptysis seems to relieve the mucous irritation, but the tubercle advances. In this form I have observed the contraction of the chest at a very early period; it would seem as if, the terminal tubes being plugged up by minute coagula, atrophy of the cells occurred long before ulceration.

LECTURE LXXVI.

TUBERCLE OF THE LUNG (*continued*).—Chronic progressive tubercle—First stage; symptoms of irritation; expectoration scanty; pain of the side—Signs on percussion and auscultation—Second stage; symptoms decided; pulse quick; emaciation increases; sweatings more profuse; cough looser; expectoration puriform, tubercular—Physical signs—Third stage; apyrexia; perspirations cease; voice lost or hollow; aphthæ on the tongue—Chronic tuberculous ulceration—Tubercle consequent on chronic bronchitis—Long duration of this variety of phthisis—Tuberculisation consequent on absorption—Phthisis complicated with empyema and pneumothorax; with laryngeal disease—Chronic latent forms—Cicatrisation of cavities—Inquiries into the state of a patient suspected of phthisis—Recapitulation of physical diagnosis.—[Fournet's views.]

CHRONIC PROGRESSIVE TUBERCLE, WITH LOCAL AND GENERAL IRRITATION, PULMONARY ULCERATION.—This is the common form of consumption, properly so called. Its symptoms have been stated so often, that their description here would be unnecessary; we shall, however, take a brief view of the symptoms and signs conjointly, in three stages of the affection—it being always understood that their combinations and characters are capable of great modification.

We may divide the disease into three stages: in the first, the tubercle is developed, but not yet suppurated; in the second, small ulcerations are formed; and, in the third, we have vast caverns excavating great portions of the lung. Between these stages there is no exact line of demarcation, but, when established, they have each symptoms and signs which are somewhat peculiar.

First stage.—The more prominent symptoms are those of irritation; cough, pain, and quickness of pulse, which in certain cases are preceded, but in the greater majority followed, by an unaccountable emaciation; the cough is almost always dry during the first few weeks, unless where the tubercle has succeeded to catarrh; it

may occur in every variety, but is most commonly a slight, frequent, and irritating cough, referred by the patient to a tickling sensation in the trachea. The expectoration, when occurring, is scanty, and consisting of a thready, greyish, and nearly transparent mucus, occasionally dotted with blood: a slight wheezing sometimes accompanies the cough.

With these symptoms the patient frequently complains of pain, which may be situated in any part of the side. In some instances it is only felt in the lower, while in others it occupies the upper part of the chest, shooting from the clavicle to the subscapular regions, and often occupying the articulation of the shoulder, when it is often mistaken for rheumatism or the pain of hepatic disease; it occurs with various intensities, is generally remittent, and often relieved by anodyne or slightly stimulating applications. I have known it to be regularly intermittent, coinciding with the paroxysms of hectic, so that the disease was taken for ague, and treated accordingly. The combination of pain in the shoulder with quickness of pulse should always excite alarm. This pain is commonly accompanied with tenderness of the subclavicular region, and often with that irritation of the muscular fibres which causes their contraction on percussion; the respiration is slightly hurried, and the first approaches of hectic can be perceived.

Under these circumstances, we may have one of two results from a physical examination; we shall either find that there is no sign of disease, or that some of the various phenomena of tuberculous irritation may be discovered.

In the first case the absence of physical signs has no value, unless considered in relation to time: thus, if the duration of the symptoms be only a few weeks, the absence of commensurate signs would be rather an argument in favour of tubercle; while, if they had continued for months, and particularly if there existed any other local or constitutional cause of hectic, the absence of signs would so far justify the opinion that the disease was not pulmonary tubercle.

But, in the second case, the existence of any of the following signs is almost enough to reveal the too fatal disease:—

Comparative dulness of the clavicle, scapular ridge, or interscapular region.

Feebleness of respiration, most valuable when occurring on the left side, and occurring with or without puerile breathing in the other portions of the lung.

The interrupted respiration.*

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* [Prolonged expiratory murmur, first noticed by Dr. J. Jackson of Boston, is a valuable though not a diagnostic sign of crude or ulcerated tubercle. In a subsequent note, more distinct mention will be made of the value of the difference in intensity and duration between the sounds of inspiration and of expiration, in aiding us to form a correct diagnosis in pulmonary tubercle.—B.]

The various *râles* combined with a feeble or puerile respiration, and confined to the upper portion of the lung.

Increased resonance of the voice, most valuable on the left side.

Loudness of the sounds of the heart in the upper portions, most valuable at the right side.

The friction sound audible in the antero-superior portions.

If we now compare the symptoms with the physical signs, we must be struck with their agreement in pointing out a progressive irritation and deposition, but without further destruction or any supersecretion from the part.

Second stage. — This is characterised by the establishment of decided symptoms; the emaciation increases; the pulse continues quick; the countenance becomes characteristic; the sweatings are more profuse; the cough looser, the expectoration becoming puriform, tubercular, and often bloody. The digestive system now begins to suffer; thirst, loss of appetite, and abdominal pains, torment the patient, and the first indications of the wasting and persistent diarrhœa appear; the patient feels that he can lie better on one side than the other, and begins to feel pain in the opposite side of the chest — a sure sign that his terrible disease has invaded the remaining lung. Notwithstanding all this, it will commonly be found that this is the period at which the patient seems to feel the greatest relief, and shows the greatest confidence in recovery; two causes seem to concur towards this result: the first, that the gastro-intestinal disease acts as a revulsive, and relieves the pulmonary irritation to a certain degree, as in the case of fistula *in ano*, and we have a painless but yet revulsive discharge.

In the next place, the pulmonary irritation is relieved to a certain degree by the secretion of pus from the ulcers and bronchial tubes; and thus, if no new inflammatory crop of tubercle is developing, a period of comparative ease is produced.

But there is a third and mechanical cause to be noticed; according as the suppuration of the tubercles extends, and the excavations enlarge, the cough often becomes much less frequent and troublesome; it no longer occurs in fits, but singly, followed by the easy expectoration of a mass of muco-puriform and tuberculous matter; this is traceable to the free bronchial communication with the ulcerous cavities. The destruction of the lung causes a relief to the patient, and too often may we hear the voice of hope and confidence reverberating in the cavity which seals the patient's doom.

The physical signs are the following:—

Increase and extension downwards of the dulness on percussion.

The respiratory murmur is feeble or changed into a semi-tracheal breathing, most audible in the erect position. This is often combined with deep-seated or superficial cavernous breathing; the *bruit de soupape* and cavernous *râles*. When the ulcerations are small and numerous, the cavernous phenomena are indistinct; and dulness of sound, with a large mucous *râle*, increased by coughing, and a semi-tracheal breathing, are the principal signs.

When the cavities are sufficiently large, some form of pectoriloquism may occur; but most commonly there is nothing but an increased and undefined resonance of the voice. These signs are most distinct in the postero-superior portions.

All varieties of the crepitating, mucous, and cavernous *râles* occur, the size of the bubbles generally diminishing from above downwards; and in certain cases the *râles* are modified by the action of the heart, or occasionally suspended by bronchial obstruction.

The respiration in the lower lobe, or opposite lung, is puerile; and we have the signs of atrophy evident, generally, in proportion to the chronicity of the case.

Third stage. — In this condition the patient is often apyrexial, and the perspirations cease, particularly if the digestive system remains healthy; the pulse may be slow, though generally becoming again accelerated before death; emaciation proceeds to the last extremity. The voice is sometimes lost, at others hollow and melancholy; the cough is loose, the respiration tranquil, and expectoration easy; aphthæ appear on the tongue, and spread over the cavity of the mouth; the limbs become cold; the breath gets a heavy odour, and the appetite in general fails. Yet the painful tenacity of life continues for a length of time, as if the patient wanted strength to die. The physical signs of this condition are so graphically described by Dr. Clark, that I cannot do better than give them in his own words.

"The chest, at this advanced period of the disease, is found to be remarkably changed in its form; it is flat, instead of being round and prominent; the shoulders are round, and brought forward; and the clavicles are unusually prominent, leaving a deep hollow space between them and the upper ribs. The subclavicular regions are nearly immovable during respiration; and when the patient attempts to make a full inspiration, the upper part of the thorax, instead of expanding with the spontaneous ease peculiar to health, seems to be forcibly dragged upwards. Percussion gives a dull sound over the superior parts of the chest, although the caverns which partially occupy this part of the lungs, and the emaciated state of the parietes, may render the sound less dull than in the preceding stage. The stethoscope affords more certain signs; the respiration is obscure, and in some places inaudible, while in others it is particularly clear, but has the character of the bronchial, or tracheal, or even cavernous respiration of Laennec. There is a mucous rhonchus; coughing gives rise to a gurgling sound (*gargouillement*); and pectoriloquism is generally more or less distinct, for the most part, on both sides, though more marked on one than the other. In this state the patient may still linger for weeks, or even months, reduced almost to a skeleton, and scarcely able to move, in consequence of debility and dyspnœa." (*Treatise on Pulmonary Consumption.* London, 1835.)

To this succinct but lucid description there is but little to be

added. When the cavities are large, there is often an absence of pectoriloquism; and the cavernous respiration, whether from the size of the cavern or the feebleness of breathing, becomes often indistinct, and as it were distant. It is at this period that the metallic phenomena are generally audible, while the respiratory murmur, which had been puerile in the healthier portions of the lung, at length loses this character.

Chronic Tuberculous Ulceration, succeeding to an unresolved Pneumonia. — In this case the progress of the tubercle is insidious; and, where the seat of pneumonia has been in the lower tube, it is reversed, beginning below and proceeding upwards. Tubercle may supervene in the sthenic or asthenic pneumonia, but much more frequently on the latter. Independent, however, of any constitutional tendencies, there are three cases in which this termination may be observed: the first, in which a sthenic pneumonia has been neglected, or exasperated in its early stage; the second, a case in which auscultation has not been employed, and the disease only rendered latent by treatment; and the third, the typhoid variety, when the strength is profoundly injured.

In such cases the lung remains solid, or we may observe attempts at resolution to occur more than once. A considerable portion of the lung may resolve, yet the process be arrested, and one part continue dull on percussion.

Under these circumstances the patient seems, for an indefinite period, in a state of imperfect convalescence; his pulse may have become slow, but it begins to rise; he does not gain flesh; some cough remains; obscure fever manifests itself; the breathing becomes hurried, and by degrees the usual symptoms appear; and he generally sinks in from three to six months from the first attack of pneumonia.

When the lower lobe is engaged, the physical signs are the following: —

Hepatisation continuing for about a month, we find a mucous rattle generally near to the root of the lung; the respiration of the upper lobe, which had been puerile, gradually becomes feebler, from below upwards, either without *râle* or with a few mucous or muco-crepitating bubbles; every day we observe the dulness to advance; the bubbles at the root of the lung become larger, and ultimately a cavity appears; then the ulcerative process stretches upwards, and new excavations appear in various portions.

When the upper lobe has been engaged, the same circumstances occur; and vacillations in resolution may be observed even after ulcerations have formed. After middle age, the process is extremely slow, and may coincide with a singularly tranquil state of the heart.

Tubercle consequent on a Chronic Bronchitis. — This combination is much more frequent than has been supposed; a great number of cases, called bronchitis, occurring after the meridian of life, are of this nature.

The cases may be divided into two classes, according to the expectoration. In the first, it has been for years concocted, or muco-puriform; in the second, it consists of a scanty serous or sero-mucous fluid. Tubercle may supervene in both cases, but is more common in the first than in the second form.

In the first case, a chronic catarrh, having existed for many months or years, passes insidiously into phthisis; or, what is more common, a peculiar change of symptoms marks the commencement of the tuberculous disease. A patient shall have had cough and expectoration for three or four years, yet preserving his flesh and appearance, and with a quiet pulse. He may then be attacked with hemoptysis; his pulse becomes quickened, and emaciation advances slowly, and he by slow degrees passes into phthisis; or a tubercular complication may supervene, without any apparent change in symptoms. The pulse may continue tranquil, and hectic be absent, and the disease be only detected by physical signs.

It is in these cases, but particularly the last, that we observe the extreme chronicity of phthisis. It may be advancing from five to fourteen years, or even longer — a fact to be explained, in part at least, by the copious expectoration which acts as an issue, and the healthy state of the digestive system. To these must be added the important condition stated by Dr. Clark, of the absence of constitutional disposition, rendering the progress of disease slower. In some instances, the disease advances steadily and almost imperceptibly; while in others there are frequent exacerbations with hemoptysis, and great increase of dyspnœa and expectoration.

I have no observations to illustrate the early stages of the transition from bronchitis to phthisis. In all cases which I have seen the disease was local, and comparison could be employed. We may then apply the diagnostics as in the third variety. Dulness and signs of anfractuosities are found, and the diagnosis will lie between dilated tubes and phthisical ulcerations. The progression of the signs, the *râle*, and the absence of the bronchial respiration, and resonance of the voice as in dilated tubes, will in general suffice for diagnosis. Of these principles, the first is the most important. In some advanced cases, great deformity is produced by the contraction of the chest.

Tuberculisation of the Lung, consequent on the Absorption of an Empyema.—We may suspect this occurrence in all cases where, after the absorption of an empyema, the cough is renewed, and the pulse becomes permanently accelerated. In neglected cases, yet in which absorption occurs, independent, or nearly so, of treatment, it is a common termination. In a few instances, an interval of quiescence intervenes between the subsidence of the first and the commencement of the second disease; while, in others, the phthisical symptoms and signs supervene immediately on the removal of the effusion. Without possessing a sufficient number of cases to determine the point, I would say that the rapid absorptions are more likely to be followed by a fatal development of tubercle than

those more chronic. And it may be inquired, whether the "*doubtful convalescence*" of Laennec is not often produced by the formation and evacuation of a small quantity of this consecutive tubercle. I have often, in such instances, been kept in a state of great apprehension, by the recurrence of *râle* and feeble respiration several times in the upper portion of the lung. In two cases I found that, although tubercle existed in both lungs, it was in much greater quantity in the side opposite to that where the pleurisy had occurred, as if the pressure had diminished the liability to tubercle. It is a curious fact, but not without analogies, that the occurrence of an empyema and pneumothorax from fistula suspends the progress of tubercle in a remarkable manner.

The physical diagnosis is often difficult from our inability to apply comparison. The pleurisy has altered the symmetry of the chest, and has caused physical phenomena, depending on the contraction; hence, in the earlier periods, the dulness and feebleness of respiration may not be tubercular, and may even occur on the side where least tubercle exists. This I have more than once verified; but when, with the symptoms of a new pulmonary disease, with hectic, and a quickened pulse, we find the opposite clavicle or scapular ridge becoming dull, and with some of the active signs of irritation, we may diagnosticate tubercle. When the disease, however, predominates in the affected lung, a curious change of phenomena is observed; the dulness and feebleness of respiration, as it were, change seats, and, in place of existing inferiorly, are perceived in the upper portion, while the lower becomes not really clearer than it was, but comparatively so.

But tubercle may supervene, even although the empyema is not absorbed. The opposite lung is then the seat of disease, which may pass into ulceration. In this way large cavities may exist in one lung, with an original empyema of the other. In some of these cases the puerile respiration of the tuberculous lung is beyond everything intense, so that a large cavity may exist, yet without our being able to detect either the cavernous respiration or gurgling. This must be borne in mind, in all examinations of the lung, previous to the operation for empyema.

In more chronic cases, however, with great emaciation and less puerility of breathing, the progress of tubercle in the opposite lung can be easily recognised by the usual signs.

Phthisis complicated with Empyema and Pneumothorax from Fistula. — I shall not enter here into the history of this triple lesion, but remark, in the first place, on the interesting fact, that the proper symptoms of phthisis are in many cases arrested, and singularly modified by the occurrence of the new disease. I have often found that, after the first violent symptoms had subsided, the hectic ceased, the phthisical expression disappeared, the flesh and strength returned; and in this way the patient has enjoyed many months of comfortable existence, and was only disturbed by dyspnœa and the sound of fluctuation on exercise.

To explain this, we must recollect the compression exercised on the lung, which, by diminishing its vascular supply, causes its atrophy and arrests its disease. The pleuritis, too, may have a revulsive effect; and perhaps the increased action of the opposite lung, by preventing the obliteration of the minute tubes, may hinder the accumulation of tubercle.

In chronic cases, where the lung is, as it were, anchored to the parietes of the chest by adhesions, the cavity from which the fistula has passed can be easily detected. With respect to the opposite lung, there is nothing to interfere with direct diagnosis, unless it be the puerility of respiration. Under the circumstances, however, any sign of irritation of the opposite lung is sufficient to point out tubercle.

Phthisis complicated with Laryngeal Disease. — I have already stated the frequent combination of ulceration of the larynx with tubercle of the lung. (See, also, Dr. Bell's Lecture (LX.) on *Chronic Laryngitis.*) The common case of phthisis laryngea is in most instances pulmonary consumption, with ulcerations of the larynx, either preceding or following the tubercular disease.

With respect to diagnosis, the early history must be examined, so as to discover whether pulmonary as well as laryngeal disease exists. If there have been cough, pain of the chest or shoulder, hemoptysis, difficulty of lying on one side, copious expectoration, any degree of emaciation, quickness of pulse, or hectic fever, before the laryngeal symptoms, there is the greatest probability of tubercle existing; or if these symptoms distinctly supervened on the laryngeal affection, forming a new train of sufferings, the same conclusion may be come to. Many cases also will be found to have commenced by an influenza, a bronchitis, or pneumonia — in all of which the complication commonly exists.

The physical diagnosis is in general easy, except in old persons, or when great stridor exists. A certain degree of stridor does not prevent a stethoscopic examination; and when the obstruction is great (a rare case), we can use percussion and measurement. In most cases the tubercle predominates on one side, and comparison can be employed.

Acute affections of the larynx are rare in phthisis. The following case presents symptoms which are somewhat difficult of explanation: —

A gentleman in the last stage of chronic phthisis, with dulness of the upper lobe of the left lung, and the signs of a cavity under the clavicle, was suddenly seized with dreadful dyspnœa, followed by a slight convulsive fit. The respiration was tracheal, but the obstruction seemed to be low down. In this state he continued for twenty-four hours, with occasional slight remissions. The difficulty of breathing then increased so much that the opening of the trachea was contemplated as a means of temporary relief. The operation, however, was not performed. Next morning, the symptoms being somewhat relieved by a blister and other treatment, I

was enabled to make an examination. The right lung sounded everywhere clear, but respiration was unusually feeble; while the left, which before presented feeble respiration and the signs of a cavity, now gave the most intense puerile murmur, masking the cavernous signs. In fact, the phenomena of the chest were completely reversed. By degrees the tracheal breathing subsided; the signs of a cavity returned; the right lung expanded as before, but a general bronchial *râle* preceded death for a few days.

These phenomena can only be explained by the temporary obstruction of the right bronchus.

Chronic latent Forms — Cicatrisation of Cavities. — I shall not dwell at any length on the remaining varieties of phthisis. Like other diseases, pulmonary tubercle is occasionally a latent disease; but I have never known it latent when considered as to local symptoms, general symptoms, and physical signs combined. The first may be wanting, the second absent or anomalous, and the physical signs obscure; but, by combining all the phenomena, the disease can be detected in almost every case. What has been already said is sufficient to guide the diagnosis (p. 331) in most cases of the senile phthisis.

On the signs of cicatrisation I have nothing to add to what has been already stated by Laennec. A certain feebleness of respiration, a little dulness of sound, and a somewhat tracheal character of the vesicular murmur, are the phenomena commonly observed.

In the examination of a patient supposed to be phthisical, the following points demand attention before proceeding to the physical signs: —

1st. The age, habit, and diathesis of the patient, and whether phthisis or scrofula have existed in his family.

2d. The exact date of his illness.

3d. Whether this has been the first attack, and how far he has been liable to bronchitis.

4th. Whether the disease commenced by laryngeal, tracheal, or bronchial irritation, or followed a pneumonia, a pleurisy, or a continued fever.

5th. Whether there has been hemoptysis, and if so, its nature, repetitions, and whether it preceded or followed the other pulmonary symptoms.

6th. Whether the cough was at first dry, or followed by expectoration.

7th. The nature and quantity of expectoration, and whether there has been a change from a mucous to a purulent character, coinciding with the symptoms of ulceration; whether any calculous matter has been expectorated.

8th. Whether there has been pain; if so, its seat and nature; whether it has affected the shoulder, side, or calf of the leg.

9th. The existence of hectic, emaciation, and acceleration of breathing; the state of the pulse, and decubitus.

10th. The condition of the digestive system.

11th. The state of the pharynx, larynx, and trachea.

12th. Whether there be any syphilitic taint, if so, examine for periostitis of the chest. Secondary syphilis simulates phthisis when the syphilitic hectic exists with the bronchial irritation which I have described. If, as is often the case, there be also periostitis of the ribs or sternum, the symptoms are almost identical.

13th. Whether the patient (if a female) be hysterical; the state of the uterine system.

14th. Whether, if there has been any external disease of a scrofulous nature, the symptoms have succeeded to its removal or diminution.

The practitioner must not build too much on the complication with hysteria. Nothing is more common than to attribute the symptoms of tubercle to this affection — an error injurious to the patient and to the reputation of the physician. The complication of the hysterical cough with fever should always excite alarm. In phthisis, if there be any cause for spasmodic cough, this character often continues to the end. Thus, where tubercle succeeds to pertussis, the original character of cough may continue long after great cavities are formed. There is, however, a singular hysterical affection with violent cough and hemoptysis, excitement of the pulse and respiration, and copious sweatings. The respiration is intensely puerile; but though the symptoms continue for months, defying all treatment, there are no signs of consolidation.

With the information thus obtained, we may proceed to the physical examination, which must be conducted in as delicate and rapid a mode as possible. It is almost never necessary to uncover the whole chest — the baring of the upper portion is sufficient. Before percussion, gentle pressure should be made on the sub-clavicular regions, to discover whether any tenderness exists, which would render its use painful. Percussion must then be performed, the patient being in the erect position, and without the head being inclined to either side. It is always to be comparative and strictly so, and we get much better results by the most delicate than by forcible percussion. The best pleximeter is the index finger, the back of which is laid on the chest. In this way the clavicles, subclavicular regions, and ridges of the scapulæ, are to be explored. If necessary, we may use percussion at the end of a forced inspiration, and compare the sound of the upper and lower portions. For the active signs the stethoscope is absolutely necessary, for the results of immediate auscultation are not sufficiently accurate; the respiration, cough, voice, and sounds of the heart, are to be explored rapidly; and an observation being made of the external appearance of the chest as to contraction, the examination is completed.

In the nervous female, and in cases in which there has been recent hemoptysis, the examination must be performed as expeditiously as possible; and in the latter case, all fatigue to the patient, and forced inspirations, are to be avoided, lest a new hemorrhage should be induced.

Before considering the treatment, we shall recapitulate the facts of the physical diagnosis. Of course many of these have been already observed by authors.

1st. That there are no physical signs peculiar to tubercle.

2d. That every known auscultatory sign, active or passive, may be met with in phthisis.

3d. That in the great majority of cases comparison can be used, in consequence of the predominance of disease in one portion of the lung.

4th. That where comparison cannot be employed, there is much greater difficulty of diagnosis.

5th. That the earliest and consequently most important signs, are, in the great majority of cases, those of irritation.

6th. That these may exist in any of the tissues of the lung.

7th. That the bronchitic signs derive their value principally from their localisation and combination with dulness on percussion.

8th. That the crepitating *râle* of pneumonia is rarely observed in the portion of the lung first tuberculated.

9th. That when it occurs it is either recurrent or continued; and in the latter case it persists much longer than in ordinary pneumonia.

10th. That feebleness of respiration is one of the most common physical signs.

11th. That although commonly combined with other signs, it may occur as the sole phenomenon.

12th. That the interrupted respiration receives its value solely from its localisation, and coexistence with other signs.

13th. That of the signs of irritation, those of the serous membrane are the rarest.

14th. That complete solidity of the lung is rare in phthisis.

15th. That in the early stages it can often only be ascertained by comparison; it proceeds from above downwards, and may exist with a feeble or puerile respiration.

16th. That perfect tracheal respiration is rare in phthisis.

17th. That when it exists it is most evident in the erect position.

18th. That one side is rarely observed to be equally dull.

19th. That the formation of cavities gives a tympanitic character to the sound on percussion.

20th. That in cases of solidity of the left lung, a somewhat similar character is given by the distension of the stomach with air.

21st. That in the universal development of tubercle, the sound is generally, but not completely, dull.

22d. That a great quantity of tubercle, when equally diffused, may coincide with but little dulness on percussion.

23d. That in ordinary phthisis the greatest variety may exist as to dulness.

24th. That the signs of irritation, and of solidification in its early stages, may be modified or even removed by an antiphlogistic or revulsive treatment.

25th. That in the early stages of the case, these phenomena only show that tubercle is about to form.

26th. That the signs of ulceration may imperceptibly succeed those of irritation, or appear at once.

27th. That they rarely exist without the signs of the earlier stages of tubercle in other parts of the lung.

28th. That they may be temporarily obscured by obstruction of their bronchial communications.

29th. That they are not audible to any distance beyond their actual situation.

30th. That the action of the heart may produce an audible agitation of the fluid contents of a cavity.

31st. That the metallic phenomena are generally perceived when the cavity is large, but may occur from several small but intercommunicating ulcerations, and may be absent even in very large cavities.

32d. That atrophy of the lung causes contraction of the chest at an early period, and independent of the formation of cavities.

33d. That in very chronic cases it may produce a deformity greater than what occurs from the cure of empyema.

34th. That the action of the heart seldom furnishes signs of value in phthisis.

35th, That in cases of tubercular deposit in the upper portion of the right lung, the sounds of the heart are often heard more loudly in this situation than under the left clavicle.

36th. That in certain cases the sounds of the heart and those produced by its impulses on the diseased lung cause a distinct rhythm.

37th. That in cases of extreme atrophy of the upper lobe of the lung, the heart ascends high in the thorax.

38th. That the subclavian artery corresponding to the affected side, occasionally presents an increased pulsation with *bruit de soufflet* (bellows sound), which can only be explained by some sympathetic irritation of the vessel.

39th. That the supervention of dulness, with the stethoscopic signs of bronchitis, indicates tubercle.

40th. That in this way we may discover tubercle in cases not localised, and consequently not admitting of comparison.

41st. That the crepitating *râle* of acute phthisis is not succeeded by signs of hepatisation, as in pneumonia.

42d. That the dulness of the acute suppurative phthisis is greater than in the non-suppurative cases.

43d. That in the hemoptysical variety of acute phthisis, there is often a want of proportion between the signs of solidification and those of pulmonary irritation. The first being well marked, and the latter comparatively wanting.

44th. That in the ordinary progressive phthisis, the physical signs accurately correspond with the successive changes.

45th. That where tubercle succeeds to an unresolved pneumonia

of the lower lobe, there are, coincident with the signs of softening in the unresolved portion, evidences of the spreading upwards of condensation.

46th. That the supervention of dulness in a case of chronic bronchitis, followed by the signs of anfractuosities, points out that tubercle is developed.

47th. That where the expectoration is scanty, and the disease very chronic, the occurrence of dilated cells may obscure the signs of tubercle.

48th. That where anfractuosities form, we may distinguish them from dilated tubes, by the dulness which has preceded them, by the signs of their extension, and by reference to time.

Here it is necessary to observe, that in certain cases of bronchitis, where the minute tubes are engaged, and with profuse puriform expectoration, the lodgment of the secretion causes occasionally a dulness of sound. But this cannot be confounded with that of tubercle, for it almost always occurs in the lower portions, is constantly varying, and may be removed (for a time) by an emetic, or a blister. I have only seen one case in which this lodgment caused a temporary dulness of the upper lobe. It was evident in the morning, but disappeared in a few hours, leaving the respiratory murmur natural.

49th. That the discovery of tubercle, in cases of absorbed empyema, is often difficult from the condition of the lungs having been altered.

50th. That where a great empyema exists, the intensity of the puerile respiration in the opposite lung may obscure the signs of disease of its substance.

51st. That in cases of empyema with pneumothorax, where adhesions prevent the collapse of the lung, the original cavity may be still detected.

52d. That in this complication, the signs of irritation of the opposite lung are almost always indicative of tubercle.

53d. That in the laryngeal complication, the physical diagnosis is in general easy, unless where great stridor exists.*

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* [Some useful additions to auscultation in the different diseases of the lungs, including phthisis, have been made lately by M. Fournet (*Recherches Cliniques sur l'Auscultation des Organes Respiratoires et sur la Premiere Periode de la Phthisie Pulmonaire*), a good summary of whose discoveries and causeless pretensions, for his work contains both, is given in the *British and Foreign Medical Review*, vol. ix. I shall draw on this latter for a few of the prominents traits in M. Fournet's work. A good means of self instruction to the student in auscultation, is presented in the following paragraph: —

If a perfectly dried sponge be alternately compressed, and allowed to dilate close to the ear, a sound, varying in delicacy with the

fineness of that substance, and distinctly conveying an impression of dryness, is perceived. If the sponge be then wetted, at first slightly, and then to a gradually increasing degree, a sensation of humidity is produced: "the humid character is at first homogeneous, then divides into a number of unequal consecutive sounds; the latter separate from each other, become isolated, and finally produce the sensation of bubbles originating, being developed and bursting." The transition from the slightest to the greatest possible degree of humidity is marked by distinct phases in the audible phenomena produced. But the result may be varied by changing the liquid with which the sponge is imbibed; when water is the fluid employed, the sensation of humidity is simple, uncombined with a character of viscidity, and resembles the respiration of an œdematous lung. If water, slightly charged with blood or gummy matter, be employed, a sensation of viscousness, such as accompanies the sound audible in a lung affected with active sanguineous congestion, is perceived. If the quantity of such fluid be increased, the bubbling character is developed; but the complete evolution of the bubbles seems obstructed by the clamminess of the tissue of the sponge. — Again, if a very fine sponge, moderately soaked with pure water, be compressed at any particular point with the finger, and then allowed to expand, a crepitating sound follows, possessing the precise characters of those puffs of crepitant rhonchus, coexisting more particularly with the inspiratory movement, in pneumonia. The perfection of the bubbling character, the duration of the sound, &c., are modified by the manner in which the finger is removed after effecting the pressure. If it be raised in a jerking manner, so as to obstruct the free ingress of air into the tissue of the sponge, it appears to effect its entry by successive efforts, the bubbling character is incompletely developed, or a few scattered bubbles only are distinguished. Now here we have exactly the characters of the crepitating rhonchus of pneumonia, when the entire mass of a lobe is, with the exception of a few vesicles, impermeable to the air; the practical inference from this is, according to M. Fournet, perfectly clear — abundant puffs of crepitant rhonchus indicate a more favourable physiological condition of the lung, than a rhonchus consisting of a few scattered and ill-formed bubbles. To us it appears that the experiment merely illustrates the practical fact ascertainable by clinical observation. When, of the kind now referred to, the crepitation commonly occurs only at every second or third inspiration, and at the close of the movement, a condition which is known to accompany the period of transition from the first to the second stage of the disease.

M. Fournet further avails himself of his experiments with sponge in illustrating the mode of production of the inspiratory and expiratory murmurs, and their relation to each other. The expansion after compression is accompanied, as we have seen, with a distinct sound; unless a coarse sponge be employed, no appreciable noise is, on the contrary, produced by its compression. The sound

elicited in the former instance is analogous to the inspiratory murmur, because resulting from the rush of air into the material experimented on; its *duration* and *intensity* are in the direct ratio of the thickness of the part compressed, in other words, of the quantity of substance acted on. In the same way, according to M. Fournet, in the normal state of the lungs and of the moving powers of those organs — that is, the number of permeable vesicles, and the force of respiration continuing the same — the duration and intensity of the respiratory murmurs will be constant quantities, and may hence be expressed numerically; to this proposition we shall presently have occasion to return. But we may not any longer delay with these experimental inquiries, which are carried much further by the author, and may be varied by any one inclined for such investigation. They certainly illustrate usefully the phenomena of healthy and abnormal respiration; for that the application of these results to the pulmonary tissue is neither strained nor inadmissible seems proved by the fact, that experiments by M. Piorry, on pieces of lung imbibed with various fluids, gave rise to precisely similar sounds. There is excellent exercise for the young auscultator, whose clinical opportunities are limited, with a piece of sponge, a basin of water, and a little gum.

On the subject of the respiratory murmurs or sounds, and the difference between the *inspiratory* and the *expiratory*, M. Fournet, as will be seen by the remarks of the reviewer subjoined, furnishes new views: —

Let us commence with the normal respiratory sounds in the vesicular section of the apparatus. Nothing is more common than to hear the inspiratory murmur of individuals characterized as "pure and vesicular," when it agrees with the adult type of health; but this expression, if meant to denote the character of the sound, to convey the notion of a successive dilatation of separate vesicles, is seriously erroneous. M. Fournet is perfectly correct in affirming that, if we look for such characters in healthy respiration, we shall search in vain for sound lungs. Far from this, the vesicular character, thus understood, is an abnormal phenomenon; whilst the true healthy sound is a mellow, continuous, gradually developed, breezy murmur, unattended with a sensation either of dryness or humidity. The use of the term vesicular is only justifiable with reference to the presumed seat of the sound. If we add, with our author, that the healthy expiratory murmur possesses precisely the same acoustic constitution as the inspiratory — that it is as soft and breezy, as free from hardness and dryness, and differing therefrom solely in duration and intensity, we shall probably startle no few practised auscultators. At least the testimony of writers of repute is to a different effect.

But the question is neither to be decided by authority, nor by an appeal to *à priori* notions on the physical play of an organ, of the intimate structure of which nothing is in reality known; — it is a question of pure observation. Let the observer place his ear to

the chest of healthy subjects, think neither of physics, nor of chemistry, nor of written dogmas, but apply his mind to perceive his own sensations, and he will invariably find that (unless when, as is not unfrequently the case, it is inappreciable by the senses) the expiratory murmur possesses all the softness, gentle breeziness and freedom from bronchial character, which belong to its predecessor in the rhythm of respiration. Above all, he will discover that the period elapsing between the termination of the inspiratory and the commencement of the expiratory sound is an almost indivisible moment; that, consequently, where the one ends the other begins — that if the former be seated in the vesicles, the latter originates there also.

But, as we have already said, these murmurs do differ in two essential points, intensity and duration; the inspiratory exceeds the expiratory in both. M. Fournet has ingeniously endeavoured to give a precise estimate of the degree of difference subsisting between them, by assigning a numerical value to each; and fixes on 10 : 2 as the ratio of their comparative intensity and duration in the healthy state.

In describing the pharyngeal, buccal, and nasal murmurs, M. Fournet dwells on the error, occasionally committed, of mistaking those sounds for bronchial respiration produced in the region to which the ear or stethoscope is applied. Independently of the difference of *quality* and of the seat of these sounds, which is easily recognised by an attentive and practised ear, there are two modes of correcting the illusion noticed by our author: the doubtful sound, if developed in the pharynx or mouth, may be altered in character by causing the patient to change the form of the openings of those parts, and vary the degree of rapidity with which the air penetrates; and again, as in some instances the pharyngeal sounds are perceived not by the applied but by the free ear, closure of the meatus of the latter will correct the error, as true bronchial or vesicular respiration are never perceived by the distal ear.

The laryngeal inspiratory and expiratory murmurs are, according to this observer, equal in intensity and duration, and may be represented by the number 20. The tendency to equalization of the two sounds increases, the higher the section of the respiratory passages in which they are examined: an observation of very nearly the same kind was made four years since by Dr. Cowan.

The diagnostic value of certain modifications of the respiratory murmurs is found to depend in a great measure on the existence of such modified character in one lung only or in corresponding parts of both organs: in other terms, certain states of respiration derive their sole, others their chief value from comparison, a fact judiciously inculcated by Dr. Stokes. Now, for the employment of this principle with precision, the respective conditions of both lungs in health require to be pre-ascertained; for a very trifling natural difference in the murmurs in each will obviously produce the same effect, as a certain amount of disease would on the supposition of

their being naturally identical. Let us suppose, for example, that a practised auscultator detects a delicate shade of difference in the *intensity* of the *inspiratory* murmurs under the clavicles; he will have an important sign of commencing tuberculization on the stronger side, provided, in the healthy state, the intensity is equal on both. Auscultators have carefully examined, therefore, whether the murmurs are similar or dissimilar in the corresponding points of the two sides of the chest; but we regret that the delicacy of the question has already interfered, and is likely to continue to interfere very seriously with uniformity of opinion respecting it. Dr. Stokes dwells on the importance of his discovery, that "in many individuals there is a natural difference between the intensity of the murmur in either lung, and in such cases, with scarcely an exception, the murmur of the *left* is distinctly louder than that of the right lung. M. Fournet has, on the contrary, satisfied himself that, in persons presenting all the characteristics of healthy lungs, the sounds of inspiration and expiration are precisely identical in all corresponding points; in the few individuals in whom he detected a slightly greater development of the *expiration* under the *right* than the left clavicle, there were some motives for a dubitative opinion respecting the state of the lungs.

The normal intensity and duration of the inspiratory sound being represented by 10, the extreme degrees of increase and decrease mark 20 and 0; between the maximum point of elevation and that of total cessation, all intermediate grades are observed. A remarkable difference in the mode of production of increase and diminution is, according to M. Fournet, that the former change never springs directly from any physical alteration in the pulmonary structure, and is produced, not in diseased parts, but in circumjacent healthy tissue; in a word, it announces the general fact, that a part of the lung supplies, by increased action, the functional incapacity of another, and characterizes *supplementary* respiration. On the contrary, the diminution of the murmur is the direct effect of some physical obstruction to the entry of the air, and represents the intensity of that obstruction. The importance of this modification, which, in the great majority of cases, affects both the intensity and duration of the sound, is apparent from the fact, that there is scarcely an organic disease of the larynx, trachea, bronchi, pulmonary tissue, and pleura, which, as well as certain spasmodic affections, is not productive of it to a greater or less amount.

In health, the inspiratory sound is uniform and continuous; this condition constitutes, according to M. Fournet, its normal *rhythm*. In cases of sharp pleurodynia, he states, this rhythm changes; the murmur becomes abrupt, jerking, and divides into several successive and unequal parts. In incipient pleurisy, in the dry stage, a similar state is however observed; so that this observation throws no new light on the diagnosis of these two complaints. During the alteration of inspiratory rhythm, the expiratory remains unchanged; a fact easily intelligible.

The expiratory murmur is subject to much greater increase in point of intensity and duration than the inspiratory: if we credit M. Fournet, the maximum increase in these respects may be represented by the number 20, that already employed to designate the corresponding condition of the inspiratory sound. Now, as in the normal state, the former and the latter murmurs are made respectively equal to 2 and 10, it follows that while inspiration is only capable of acquiring double its healthy duration, expiration may attain ten times the natural proportion. And again, as it is elsewhere stated, that while the expiration undergoes this enormous rise, the inspiratory sound may fall to 1, it follows that instead of the expiration being only one-fifth as intense as the inspiration, it may be twenty times as intense as the latter; and hence, that it may actually bear one hundred times a higher proportion to the inspiratory murmur than natural. We are almost persuaded there is exaggeration in this expiratory estimate; at least we have never, ourselves, observed a degree of prolongation in cases of vesicular emphysema (wherein the abnormal extension has to us appeared to reach its utmost limit) which could be rated at more than five or six times the natural amount.

Augmented expiration may either coexist with a proportional increase in the inspiratory murmur, or the healthy ratio of the two phenomena may be destroyed by an accompanying fall in the inspiration. The former condition occurs in puerile or supplementary respiration; the latter in the early stage of phthisis, and in emphysema: these are indeed the only affections in which the disproportion exists to a very large amount, and hence its special value in their diagnosis.

The diagnosis of the first stage of pulmonary tubercle has received accessions by the labours of M. Fournet. I must, in illustration of this fact, confine myself to the following synopsis prepared by the reviewer, to whom I am entirely indebted in this note.

But the facility with which these signs may be ascertained, the constancy of their presence, the regularity of their progress and catenation, form almost as important elements in judging of the confidence to which they are in practice entitled, as the actual reality of their existence. Upon some of these points, in so far as they are capable of being generalized on, M. Fournet speaks with just appreciation of the difficulties of clinical medicine.

"The observer must, while investigating the local signs, carefully guard against being influenced by any preconceived opinions, originating in the external appearance, or in the commemorative or general symptoms of his patient. If dominated by an opinion, in great measure already formed, the very best auscultator is not unlikely to become so careless and inattentive in his examination, that the impressions received by the senses are, without his being aware of it, converted into so many confirmations of his preformed judgment. This is the more likely to happen, because the phenomena appreciated by the senses and the mind are very numerous,

and only distinguishable by very delicate differences from others of wholly distinct diagnostic force. When a first examination has been made, under circumstances like these, we are sometimes astonished at the variation in the result of a second.

First Stage.

First Phasis. — A few small tubercles scattered through the lung.

- Inspiration, dry, rough.
  - intensity increases to 12.
  - duration falls to 9, 8.
  - quality, natural.
- Expiration, dry, rough.
  - intensity } rise gradually to 8.
  - duration }
  - quality, clear, ringing.
- Commencing bronchophony in rare cases.

Second Phasis. — Infiltration of crude tubercles in groups.

- Pulmonary crumpling sound.
- Dry crackling rhonchus.
- Sonorous, sibilant, rhonchi (symptomatic of bronchitis).
- Inspiration — intensity = 12, 14.
  - duration = 9, 8.
  - quality, clear, ringing.
- Expiration, intensity } = 6, 10.
  - duration }
  - quality, blowing, rarely bronchial.
- Dryness and roughness of respiratory murmurs are now masked by change of quality.
- Slight bronchophony, frequently.
- Slight obscurity of sound on percussion.
- Diminished vocal fremitus.
- Unnaturally distinct transmission of cardiac sounds.

Third Phasis (or of transition from first to second stage). — Commencing softening.

- Humid crackling rhonchus.
- Sonorous sibilant rhonchi, as before.
- Pulmonary crumpling sound disappears.
- Inspiration — intensity = 15, 18
  - duration = 7, 6, 5.
  - quality, blowing, or slightly bronchial.
- Expiration, intensity } = 12, 15, 18, 20.
  - duration }
  - quality, bronchial.
- Strong bronchophony, or imperfect pectoriloquy.
- Sound more obscure, or even dull.
- Vocal and tussive fremitus much diminished.
- Diminution of partial movements of ribs corresponding to indurated mass.
- Transverse retraction of corresponding part of the chest.
- Subclavicular flattening.

"The physical signs are not, as might be believed, pathognomonic of phthisis; for such signs alone merit that title as belong exclusively to a certain anatomical condition. . . . . Some observers consider a prolonged expiratory murmur peculiar to phthisis, and almost all that has been written on the sound of expiration bears the impress of this idea; the belief is a groundless one, for the expiratory murmur manifests itself in a multitude of different conditions. . . . But from mutual combination, from coex-

istence with some signs, and from their appearance, independently of others, the phenomena described may lead to a precise diagnosis of tuberculization; their primitive or absolute value goes no further than pointing out the presence of induration or foreign bodies in the pulmonary tissue. . . .

"At a very early age no inference could, I think, be drawn from the existence of the morbid characters of the respiratory murmur, which I have assigned to the first phasis, — in many instances even to those of the second." (p. 263, *et seq.*)

Fully as we assent to the justness of these remarks generally, we would, nevertheless, point out a slight contradiction between one of them and the author's previous assertion, that the dry crackling rhonchus is peculiar to tuberculization, — if peculiar to, it must, when present, be pathognomonic of the disease. — B.]

LECTURE LXXVII.

PULMONARY TUBERCLE (*continued*). — *Treatment of phthisis*—To be considered under two heads; the curative and the palliative—The indications in both are to remove irritation of the lung and to improve the general health—Constitutional and accidental phthisis—Tubercle is preceded almost always by irritation—Circumstances to guide the practitioner—Treatment of localised bronchitic variety; of the hemoptysical variety; of the pneumonic variety—Treatment after excavation has formed—Incurable consumption—Palliative treatment; of the more distressing symptoms, such as hectic, pain, cough, expectoration, hemoptysis, and diarrhœa.

TREATMENT OF PHTHISIS. — We may consider this treatment under two heads, viz., — the curative and the palliative: the first, the attempt to eradicate the disease by active treatment; the second, the relieving the various distressing symptoms of a hopeless consumption. And however differing in detail, the principle of both methods is the same, namely, the removal of irritation from the lung, and the improvement of the general health.

It unfortunately happens that the palliative treatment is that which we must generally follow; but there can be no doubt that as medicine advances the cures of consumption will be much more frequent; its nature will be better understood, its first stages more commonly recognised, and the disease prevented from proceeding to incurable disorganisation.

The first, the most important point in preparing ourselves for the successful treatment of phthisis, is to have clear notions as to its connection with irritation.

Without adopting the opinion of Broussais, that phthisis is nothing but a chronic pneumonia (*Histoire des Phlegmasies Chroniques*, vol. ii. See also his *Commentaires sur les Propositions de Pathologie*), but rather holding with Andral, Carswell, Forbes, and Clark, that the tubercular matter results from a lesion of secre-

tion, we must admit its connection with a state of irritation in most cases. There are some, indeed, where the matter seems deposited without any such action, but these are comparatively rare.

Before entering on this subject, I shall state the division of cases of phthisis which I have generally followed with relation to treatment. They may be separated into two classes, the constitutional and accidental phthisis. In the first, tubercle supervenes either with or without precursory irritation, in persons strongly predisposed to it by hereditary disposition or original conformation. In these the disease is generally rapid, invades both lungs, and is complicated with lesions of other systems. The disease is constitutional, and the affection of the lung, though the first perceived, seems but a link in the chain of morbid actions.

In the second, we meet the disease in persons not of the strumous diathesis, and who have no hereditary disposition to tubercle. The disease results from a distinct local pulmonary irritation, advances slowly, and the digestive and other systems show a great immunity from disease.

In both cases we may effect a cure; but this result will be more often obtained in the latter than in the former class. The value of early treatment is of course greater in the constitutional than the accidental case. In the early stages of the constitutional disease, recovery is only to be effected by treatment; in the advanced cases, when it does occur, it seems almost independent of treatment.

In the accidental phthisis, the lesser tendency to abdominal and other complication, allows time for the vital powers to act; while in the constitutional variety, tubercle is commonly deposited throughout the body, and the patient dies rapidly in consequence of such extent of disease.

But to return to the connection with irritation, we find it, in the great majority of cases, to precede, accompany, and accelerate the disease; and further, that within certain limits it is by removing irritation that we best succeed in effecting a cure. Without this principle we have no key to the treatment of phthisis. Tubercle is preceded by irritation. This is seen in the history of almost every case; an ordinary cold, an attack of influenza, a pneumonia, a pleurisy, the bronchial irritation of hooping-cough, or the exanthemata — these admitted conditions of irritation are commonly the first links in the chain of consumptive symptoms. How commonly in the strumous diathesis do we see individuals continuing free from phthisis for many years, till an attack of pulmonary irritation occurs, and then we can trace the first growth and progress of tubercle. And, if further evidence is necessary, let us recollect the effect of injuries of the chest, and the phenomena of the acute inflammatory tubercle.

That tubercle is accompanied by irritation hardly demands proof. Fever, cough, excitement of the lung, and acute pain, declare the inward disease. Or if we turn to anatomy, we find actual inflammation of the tissues of the lung, redness, thickening, softening, and

ulceration of the mucous membrane, purulent secretions, vermilion redness of the inter-tubercular tissue, solidification of the lung, and lymph on the pleura. Finally, it is not uncommon to see the patient suddenly cut off by some violent inflammation, pneumonia, pleurisy, cerebritis, or enteritis.

But tubercle is not only preceded and accompanied by irritation, but it is hastened by it. Every new attack of irritation is followed by increase of the tubercular symptoms, unless it be of the surface, when a revulsive action, proving the general proposition, is occasionally seen.

Lastly, experience shows, that it is by means calculated to diminish irritation of the lung at the least expense to the constitution, that we can best palliate or delay the progress of phthisis; and I trust to be able to show that the antiphlogistic treatment is the true mode of arresting the disease in its early periods.

Thus the proposition is proved by the study of symptoms, by the results of anatomy, and by the experience of treatment. It is hardly necessary to repeat that there are cases of extensive tubercular formation, in which irritation is either absent, or but little marked. These are always incurable, happily they are rare.

On being called to a case of phthisis, the practitioner has to decide whether to adopt the curative or palliative treatment. The following are the circumstances which may induce him to attempt the cure: —

1st. The absence of the strumous diathesis, or an hereditary disposition.

2d. The fact of the disease being recent; for, *where physical signs of tubercle exist*, the chance of recovery is inversely as the duration of symptoms.

3d. The want of proportion between the extent of disease as indicated by physical signs, and the duration of symptoms. If the extent be slight, although symptoms have existed for months, it shows a power of resistance in the economy.

4th. The calmness of the pulse.

5th. The absence, or slight degree of emaciation or hectic.

6th. The healthy state of the digestive system. In all the extremely chronic cases which I have observed, the digestive system continued healthy, and I never heard of a recovery after diarrhœa had occurred.

7th. The fact of the disease having distinctly supervened on a pneumonia or bronchitis.

8th. The occurrence of free expectoration from the first period of the cough. An important character, as showing an early attempt to relieve the irritation by secretion.

9th. The healthy state of the larynx. Most important. The combination of even a small quantity of pulmonary tubercle, in laryngeal disease, is always fatal.

10th. The disease, as shown by physical signs, being confined to one lung, and to a small portion of that lung.

11th. The absence of the signs of cavities. This requires explanation. We know that recovery happens after the formation of cavities, but in most cases their existence implies that of tubercle in great quantity, occupying other portions of the lung.

12th. The absence of puerile respiration in the healthy portions of the lung. This character is of value, as showing that a small part of the lung is obliterated, and indicating a quiescent state of the other portions.

13th. The absence of the signs of atrophy.

It is not meant that a case should present all these characters in order to justify our hopes and attempts of cure; any of them are of value. Of course the more of them present the better; and, excluding the first character, they may be all available in any case of phthisis, whether constitutional or not.

Incipient curable phthisis is met with in one of three forms, which may be designated as the Localised Bronchitic, the Tracheal, the Hemoptysical, and the Pneumonic varieties. We shall discuss the treatment of these separately.

Localised Bronchitic Variety. — This is shown by the existence of the signs of bronchial irritation already described. They occur in the upper portion, are combined with vesicular murmur, and with slight dulness. The pulse is quickened, the cough is generally dry, but the hectic is not yet confirmed, nor is emaciation decided.

At this stage the experience of a great number of cases enables me to say that a cure can be performed. This is the period for exertion on the part of the physician, but that in which precious time is commonly lost.

There is a local irritation to be subdued; tubercle may or may not have formed. In the first case its quantity is so small, that nature often is able to throw it off; in the second case, it is threatened, and every day, by promoting irritation, increases the chance of its deposition.

The patient must be confined to his room, and all exertions of the lung forbidden. If he be of a robust habit, and the pulse is inflammatory, a single bleeding from the arm is to be performed; the bowels must be kept gently open, and the diet consist of milk, farinaceous substances, and light vegetables.

Leeches are to be applied in small numbers, alternately, to the sub-clavicular and axillary regions of the affected side. This depletion is to be repeatedly performed, the cupping-glass being occasionally used over the bites. Under this treatment the *râle* will be commonly removed, the vesicular murmur increased in strength, and the dulness diminished, and all this with corresponding relief to the symptoms. We are now to commence the use of blisters, which are to be continually applied under the clavicle and over the scapular ridge. Their size should not exceed that of a dollar, and they must in all cases be covered with silver paper. A blister is to be applied about every three days. This counter-irritation is to be

persevered in for several weeks, when the blister under the clavicle may be converted into a superficial issue, by dressing the surface with a disc of felt, and a combination of mercurial and savin ointments. During this treatment the cough is to be allayed by mild sedatives. The following is the formula which I employ at this stage:—℞. Mucilaginis Arab. vel Tragacanth. ℥iii.; Syrup Limon. ℥ss.; Aq. puræ, ℥iiss.; Aq. Lauro-Cerasi, ℥ss. — ℥i.; Acetatis Morphiæ, gr. i. This can be permanently used without deranging the stomach.

As soon as the issue is established, the regimen may be improved. The patient may now commence the friction with the turpentine liniment, and if necessary, use inhalations of the vapour of water impregnated with a narcotic extract. From twelve to fifteen grains of the extract of cicuta may be employed, at each time of inhalation. In mild weather, horse exercise should be taken, and the invalid, to perfect his recovery, should remove to a milder climate, and frequently change his situation.

Such is the treatment of the most common form of incipient consumption. We owe the principle of local depletion to Broussais, and among the many boons which he has conferred on practical medicine, there is none greater than this. On this subject I shall quote two of his propositions: —

"*Les sangsues placées à la partie inférieure du cou, entre les insertions des muscles sterno-mastoïdiens, enlèvent le catarrhe bronchique et préviennent la phthisie pulmonaire.*

"*Les sangsues placées autour des clavicules et sous les aisselles arrêtent les progrès d'un catarrhe qui vient de s'introduire dans le lobe supérieur et qui aurait infailliblement produit la phthisie pulmonaire. Un son mat ou moins clair, tout récent, annonce que le catarrhe a pénétré dans le parenchyme, et indique qu'il faut insister sur les saignées locales.—Examen des Doctrines Médicales*, vol. i.; *Propositions de Médecine*, prop. cclxxiii. See also his *Commentaires sur les Propositions de Pathologie.*

Incipient Tracheal Irritation. — A person of a strumous habit some of the members of whose family have been cut off by phthisis, which set in with symptoms precisely similar to his, is attacked, after exposure to cold, with a loud ringing cough, occurring in distressing and uncontrollable paroxysms. He has pain and soreness of the windpipe, loses flesh, and is feverish at night. There is frequently pain of the chest and shoulder, and some acceleration of breathing. The pharynx is healthy, or only slightly vascular. On percussion both lungs sound well and equally, and the respiratory murmur is everywhere audible.

The treatment in this case must be active and decided, for if neglected the disease runs into the miserable complication of pulmonary tubercle with laryngeal ulceration.

The patient must be confined to bed, or to a warm room, and placed on a milk diet; all exertions of the voice are to be prohibited. Leeches are to be applied daily to the windpipe, beginning

with from eight to ten, and diminishing the number for four or five days; blisters may then be applied to the nape of the neck and sternum.

But these remedies, though successful in a few cases, may fail, unless we adopt the mercurial treatment first recommended by Mr. Porter in sub-acute laryngitis. By the use of mild but frequently repeated doses of the ordinary mercurials, in combination with opium, we are to affect the gums gently, but decidedly; when it will commonly happen that all tracheal and pulmonary irritation shall subside.

Thus by the use of mercury we prevent the development of tubercle. This brings us to the important subject of the mercurial treatment of incipient phthisis. Before entering on it, however, we shall notice the two remaining cases for treatment.

Hemoptysical Variety. — An individual in perfect health, or labouring perhaps under a slight cold, is attacked with copious hemoptysis, accompanied with great excitement of the heart. The hemorrhage having nearly subsided, we find the breathing and circulation quick; cough continues, and there may be local pain. The upper portion of one side sounds dull, and here the respiration is decidedly feeble, although generally with little *râle*. This interesting fact has been already alluded to. The absence of *râle* probably proceeds from the obstruction of the minute tubes by coagula. In a case of pulmonary apoplexy, I found every tube that could be traced plugged up by a bloody coagulum. But in certain cases of the strongly marked strumous diathesis we see a rapid advance of tubercle without the stethoscopic signs of mucous irritation, particularly when repeated bleedings has been performed.

In these cases the tubercular development is often astonishingly rapid, no interval occurring from the first invasion. In a few, however, there is an interval of calm between the cessation of the hemorrhage and the phthisical symptoms.

For controlling the hemoptysis the best treatment is general, followed at once by local or revulsive bleeding. Guided by the stethoscope, we apply a great number of leeches over the affected part, and repeat this treatment frequently. In a few cases I have seen leeching the feet, followed by the pediluvium, to have an excellent effect; but it is decidedly inferior to local bleeding. It is always better to control the bleeding in this way than by direct astringents; if, however, we must have recourse to these remedies, we may employ the acetate of lead in full doses, combined with opium, and a little excess of acetic acid, or we may use the sulphuric acid and alum. I have never applied cold to the chest. The patient is to be kept perfectly at rest, and all unnecessary examinations avoided.

Dr. Cheyne has given the weight of his testimony strongly in favour of bleeding in the hemoptysical variety of phthisis, and, in cases of bronchial hemorrhage threatening consumption, he recommends small bleedings at intervals of a week. He considers

bleeding to be justified during hemoptysis, or any symptom or sign of inflammation. In such cases he exhibits tartar emetic in nauseating doses, or the combination of one-fourth of a grain of tartar emetic, with ten or fifteen grains of nitre, a combination in which he places great confidence. (*A letter on Hemoptysis, &c., Dublin Hospital Reports*, vol. v.) In such cases I have not used emetics, from a dread of their increasing hemorrhage. I have seen death to occur in a case of hemoptysis, in consequence of an enormous eruption of blood after vomiting, induced by a very small portion of tartar emetic.

The hemorrhage being controlled, the indication is to restore the lung to health as speedily as possible. All the means pointed out in the treatment of the first variety are to be used, but with greater activity. I shall presently notice a case in which mercury was employed. "The treatment," says Dr. Cheyne, "which I would recommend in incipient phthisis may be stated in a few lines. Journeying, if practicable, or what is better still, in fine weather, going from shore to shore in the steamers; short residences at Mallow, or the Cove of Cork, or some favourite spot in England, or, during the summer in Scotland. Diet as generous as the state of the lungs will permit; in some cases a glass or two of claret, and small bleedings. Sponging the chest and arms with very dilute nitro-muriatic acid, or with five parts of Mindererus's spirit, and one of spirit of rosemary; an issue over the most suspected portion of the lungs, or a succession of blisters, after each bleeding, each not much larger than a dollar; a light bitter two or three times a day, with twenty or thirty drops of laurel water, or the nitro-muriatic acid internally, or perhaps some preparation of iron. If I had time I would explain my reasons for rarely sending patients, in any stage of consumption, to the continent of Europe." — *Op. cit.*, p. 364.)

Pneumonic Variety. — This has been already alluded to when describing the succession of tubercle to an unresolved pneumonia. But the case of pneumonia occurring in a strumous habit, and particularly when engaging the upper lobe, may be arranged under the same head. In this case the disease may be primary, or occur in the secondary form. The treatment is to consist in repeated local bleeding with the cupping-glass, continued counter-irritation, the use of the seton, and the employment of mercury and sarsaparilla, as in the case of chronic pneumonia.

Mercurial Treatment of Incipient Phthisis. — The idea of arresting the progress of scrofulous inflammation of the lung by mercury occurred about the same time, and without any mutual communication, to my friends, Drs. Graves and Marsh, and to myself, and for the last few years these gentlemen and I have treated with mercury several cases of incipient pulmonary disease, which would in all probability have ended in phthisis. This subject is alluded to in Dr. Graves's Clinical Lectures. The facts stated in Dr. O'Beirne's valuable paper on the use of mercury in diseases of

the cartilages (*Dublin Medical Journal*, vol. v.), first led to the hope that by similar treatment a strumous inflammation of the lung might be arrested. But a great number of observations must still be made in order to establish the actual value of this practice, and it must be recollected, that in the cases thus treated other and active means were employed to remove the local disease.

Independent of the case of tracheal irritation, I have observed the action of mercury in some instances where the lung was decidedly engaged; in two, permanent recovery followed; in one, the disease was arrested for some months, after which it returned with its former symptoms, and the patient died tuberculous; and in one, although mercury was thrice employed, no good effect whatever followed; and on its last exhibition the remedy manifestly disagreed. I shall briefly notice these cases.

A gentleman, aged twenty-four, was attacked with violent hemoptysis; in a week afterwards he presented the following symptoms: the respiration was hurried, the cough troublesome, with a scanty, mucous, and bloody expectoration; the pulse quick, and the action of the heart strong; fever of a remittent character, with a tendency to perspiration, existed; the patient lost flesh, looked pale and haggard, and complained of pain in the upper portion of the left side.

The antero-superior portion of the left side sounded comparatively dull; the respiration was here very feeble, with an obscure *râle* evident on deep inspiration; clearness of sound and puerile respiration existed over the remaining portion of the chest.

No doubt could be entertained that if the symptoms and signs were not removed, a rapid consumption would ensue. The patient was confined to bed; bleeding, both general and local, was repeatedly performed, and mild mercurials exhibited at short intervals of time. The constitutional symptoms were much relieved, but the local signs continued unchanged, and the system resisted the mercurial action; calomel was now exhibited, and ptyalism at last produced, when a marked amendment took place, the sound became much less dull, and the respiration louder. The remedy was now omitted, and a large open blister established, and the patient was removed to the country. His convalescence was slow, but satisfactory; the pulse was kept in check by prussic acid; and in the course of a year his health was restored. During this time several slight relapses took place, but they yielded to local depletion and counter-irritation over the affected part. A slight degree of atrophy of the sub-clavicular region occurred.

A gentleman, aged thirty, was affected for several months with severe dry cough, which was frequently aggravated by exposure to cold and fatigue; he became pale, his pulse was quickened, and he presented all the appearances of approaching consumption. The right clavicle and scapular ridge sounded slightly, but decidedly dull; the respiration in the upper portion of this lung was feeble, and mixed with an obscure mucous *râle*; no signs of bronchitis

existed in any other portion of the lung. These circumstances, and the fact of the patient having lost two brothers in consumption, excited the greatest alarm.

The trachea was repeatedly leeched, and mercury, first in the form of blue pill, and afterwards in that of calomel, exhibited; after a considerable time, full ptyalism was produced, when all the symptoms subsided, the chest regained its sonoriety, and the *râles* altogether disappeared; the patient regained his flesh and strength; several months are now elapsed, and he remains in the enjoyment of perfect health.

A middle-aged female was admitted into the Meath Hospital with acute phthisis, under which she speedily sank; the lungs were found tuberculated. It appeared that about three months before her final attack she had been seized with symptoms precisely similar to those which ushered in her last illness; these were subdued by mercury, and during the interval of the two attacks she had remained free from all pectoral symptoms.

A woman was admitted into the Meath Hospital, labouring under violent symptoms of pneumonia, principally affecting the upper portion of the left lung, which resisted repeated bleedings, both general and local, and the use of tartar emetic; the disease extended to the left lung, without, however, passing into hepatisation in the right; mercury was now exhibited, and the mouth made sore, but without any alleviation of symptoms; copious expectoration came on, and the patient died in about three weeks in great agony. Both lungs contained numerous small, transparent tubercles, the intervening tissue was of a grayish-white colour, and the lung infiltrated with an enormous quantity of a white serous fluid.

A gentleman was attacked with hemoptysis, followed by violent and distressing cough; under the supposition that the liver was diseased, mercury was exhibited, but without improvement; he then came to town. He had cough, hoarseness, emaciation, and a quickened pulse, and the right clavicle presented a slight degree of dulness. It was determined to again employ mercury, but the medicine distinctly disagreed, no ptyalism was induced, the tubercular symptoms rapidly advanced, and the remedy was of course omitted.

A gentleman, residing in France, was attacked with severe cough, with pain in the chest and tendency to hectic. A syphilitic affection had previously existed, but, in its primary form at least, had been removed. The symptoms continuing, he came to Dublin. He was emaciated, had incessant tracheal cough, with great irritability of the nervous system. The fits of coughing were most distressing. In addition to these, he had severe pain in the upper sternal and right sub-clavicular regions, which seemed to proceed from periostitis, a diagnosis rendered more probable from the fact of his having distinct periostitis of the scalp, accompanied by maddening headaches. From the violence of the cough, an accurate stethoscopic examination could be scarcely made.

A mild mercurial course completely removed all these symptoms.

The patient felt for several weeks restored to a state of health to which he had been long a stranger. He regained his flesh, strength, and appearance, his pulse became perfectly quiet, and he returned to the continent. In little more than two months he died of pulmonary tubercle.

I have now stated my experience of this matter. As to the general employment of mercury in incipient phthisis, I am anything but sanguine; yet that by its assistance in removing irritation from the mucous membrane and parenchyma, we may occasionally arrest the development or progress of tubercle, seems more than probable; for there can be little doubt that, in the scrofulous habit, there is more danger of tubercle from the persistence of irritation of the lung, than from the action of mercury on the system; but the remedy is a two-edged sword, and its exhibition must not be lightly attempted. Extensive numerical investigations must be made before the treatment can be considered as in any way established. The subject is one of the greatest importance. In all cases, it must be remembered, that under treatment physical signs will disappear, or become less evident; and that this proceeds from the removal, not of tubercle, but of intercurrent irritation of the lung. We must, therefore, use the greatest caution in prognosis, and in all investigations bearing on the point, the subsequent history of the patient, for months or years, must be, if possible, ascertained.

After the early stages of treatment, if an arrest of symptoms be happily produced, an issue or seton should be established; and the patient should travel, and choose for the next season a temperate winter residence.

Treatment after Excavation has Formed.—In a few cases, even after excavation has formed, I have seen a recovery.* In these cases

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* [Curableness of Consumption.—Doctor Stokes, it will have been seen, considers phthisis to be curable. I might have extended my remarks on this point in a preceding lecture by references to the additional experience of other writers than those there cited, in favour of the curableness of consumption. Dr. S. G. Morton, in his valuable "*Illustrations of Pulmonary Consumption*," distinctly expresses his conviction, not merely of the cicatrisation of open tubercles but of their entire removal by absorption. But the most extended investigation of the subject yet made is by M. Rogée (*Sur la Curabilité de la Phthisie Pulmonaire, &c.*). His observations were made in a careful *post mortem* examination of more than two hundred subjects. Of this number there were a hundred old women, upwards of sixty years of age. M. Rogée noticed more particularly two kinds of lesion at the apex of the lungs, which seemed to him of peculiar interest, viz., cretaceous or calcareous concretions, and cicatrices of the pulmonary tissue.

The concretions were found by M. Rogée in fifty cases out of a hundred; their situation corresponding precisely with that of tuber-

there was no evidence of the advance of tubercle, and the larynx and digestive system escaped disease. In other instances, treatment has distinctly prolonged life for many years. The principal remedy employed was the seton, with frequent changes of air, or sea-voyaging. In some cases the patients confines themselves to a milk and farinaceous diet, while in others they lived freely, indulged in wine, and entered into all the enjoyments of society. In one case, where a large cavity existed, the symptoms subsided on the occur-

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cles as commonly seen in the lungs, viz., at the summit of the lung thirty-nine times; equally distributed through the lung six times; in several parts of the lung, but not at the apex, six times. The relative frequency of the concretions in the two lungs were as follows: —

In both lungs, simultaneously . .	24	times.
In the right lung	17	„
In the left lung	10	„
	51	

Very frequently when there were concretions in the lungs there were also some in the bronchial glands. In size they were equal to a grain of hemp or a pea; sometimes equal to a hazlenut; and, again, often as small as a millet-seed. They were found in distinctly tuberculous lungs as well as those otherwise healthy.

M. Rogée does not hesitate to regard these cretaceous and calcareous concretions as the result of the transformation of tubercles; in fact, of tubercles which were healed. An additional argument in favour of his opinion is adduced by him, in the fact of concretions being sometimes found in the lymphatic ganglions, which are also occasionally the seat of tubercles.

Cicatrices are next noticed by M. Rogée. He divides them into four species: — 1. Cicatrices with the cavity still preserved. 2. Cicatrices with cretaceous or calcareous matter filling the cavity. 3. Fibro-cartilaginous cicatrices. 4. Cellular cicatrices. He details cases of persons at very advanced age, one of a woman eighty-four years old at the time of her death, in whose right lung were found two caverns perfectly cicatrised; a third less advanced containing tuberculous matter, which had passed into the cretaceous form. In the left lung there was a calcareous concretion. In two other cases of women, each seventy-four years of age at the time of death, cicatrised excavations were found, which had no communication with the bronchia. The whole paper of M. Rogée, which is published in three consecutive numbers of the *Archives Générales de Médecine*, 1839, merits an attentive perusal. He certainly must obtain credit for establishing the position with which he set out, that *pulmonary consumption is curable*. — B.]

rence of fistula in ano. The individual is now in robust health. Two of his brothers died of phthisis.

In a case with cavity, yet in which the symptoms and signs are not progressive, the patient's best chance I believe to be the use of the seton, and travelling. If he does not recover, his life will be probably prolonged. He should take as little medicine as possible; he should adopt all strengthening means, and use such a regimen as experience points out as the best. Heated rooms, cough mixtures, acid draughts, inhalations, narcotics, "repeated counter-irritation," and all the varied and harassing treatment which ignorance supposes to be curative — these are not the means of recovery. So long as a drain from the chest does not weaken, it is clearly useful, and all the other means should be calculated to give enjoyment to the mind and to strengthen the body. See Dr. Forbes's notes to the translation of Laennec's Works, article Phthisis Pulmonalis. It is no little gratification to me to find my views of treatment of confirmed phthisis coinciding so closely with those of this distinguished physician, to whose exertions British medicine owes so deep and lasting a debt. Our experience of the use of issues is different; but only so far, that in a certain number of cases, very limited, indeed, I have known recovery, or great prolongation of life, to occur after their employment. In the vast majority of cases, however, they seem worse than useless. The patient's winter residence should be, if possible, in a temperate climate; but his occupation in summer and autumn months should be travelling. The temperate and even colder countries may be visited with advantage. For winter residences in this country, the patient may choose, in Ireland, the Cove of Cork, and also Mallow; and in England, the various coast-towns of Devonshire and Cornwall. Of the latter, I have the most favourable experience of Torquay. Dr. Forbes speaks favourably of Penzance. See his Observations on the Climate of Penzance.

In the essential point of equability of temperature, the Cove of Cork is surpassed by few places. Recent observations have shown that the mean difference of temperature of the days and nights rarely exceeds four or five degrees, and often in the winter months does not exceed one degree. The town is completely sheltered from the north wind, and, from its southern exposure, receives the full influence of the sun and the southern breeze.

It is only within the last few years that Cove has attained its celebrity. It is now the resort of many invalids. Of course, as in all places of the kind, the good effects of the climate are seen more in the temporary improvement in the health of patients than in their final or permanent cure. Such, however, is the penalty which all places of the sort must pay for their celebrity. Patients in the advanced stages of disease are continually arriving, and the favoured climate is expected to effect impossibilities.

I shall not enter further into the subject of climate, but refer with pleasure to the works of Dr. Clark; works which must ever be the

guides of the consumptive, and the text books of the student of consumption.* I have not alluded to iodine, because I believe that as

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* [In the United States the climate of East Florida has been highly lauded by many invalids, and more than one professional writer on the subject. Dr. Forry (*op. cit.*) in particular, is warm in his eulogies of a region which seems to have become in a sort endeared to him by the very hardships which, as one of the campaigners in the Indian war, he necessarily encountered. He describes the peninsula of Florida as "possessing an insular temperature not less equable and salubrious in winter than that afforded by the south of Europe." The comparison meant to be advantageous for Florida is not, however, you will have learned from the facts and tenor of my lecture on the "Causes of Consumption," (LXXIII.,) over flattering in fact. If the science of statistics, or, as it is the fashion of the day to call it, "the numeral method," were applied to an investigation into the proportion of cases of, I will not say cure, but of real relief and prolongation of life, I am afraid that much of the favourable opinion now entertained in favour of the countries bordering on the Mediterranean would be dispelled. The reputation of the West India Islands, for the sanative influence of their climate is very much on the same deceptive basis — maugre the praises of St. Croix and certain parts of Cuba sounded by both invalids and physicians. The southern portion of the island of Cuba, the one as yet hardly spoken of, is that, however, on which our hopes must rest for a winter residence for the consumptive.

I would not advocate the other view of the subject taken by the late Dr. Parrish, to "rough it" in nearly all weathers (*North Amer. Med. and Surg. Journ.*, vol. viii.); disregarding, at any rate, the winter's piercing cold, or Boreas's rude blast; but I believe that the strongest examples of suspension of phthisis, perhaps of cure, in its incipient stages, have been furnished by those who have been most intent on change of air and scene, by almost continual travel,—now south, then north—one year in the far east, another roaming west. Next to this extended travel will be that course better adapted to the pecuniary resources as well as the feeling of the majority of phthisical invalids. It is to travel for weeks, it may be months entire, on horseback. Even at their own homes this kind of exercise can be taken daily; and who has not seen, by a persistence in this plan, invalids apparently in the last stage of decline battle it out for many months with the grim tyrant.

Notwithstanding the prejudice, for I believe the adverse opinion amounts to this, against rooms artificially warmed, I should prefer for myself to reside in a house with equable temperature and moisture kept up during the winter and spring months, with adequate ventilation, and the privilege of sallying out for a short walk, or preferably still, a ride on horseback, whenever a genial sunshine and a southern air would allow of exit from the house. These, with the comforts of

yet no case has been made out in favour of its exhibition. That its employment is generally adopted on the grounds of false analogy, and in ignorance of the pathology and pathological anatomy of tubercle, cannot be denied, and the consequence is what we might expect, that it is the favourite remedy of the harpies of medicine. Many cases may we see in which precious time is lost in the administration of the supposed specific; many cases of injury of the digestive system, and of acute irritation of the lung, occur from its use, whether it be exhibited by the stomach, or brought to the lung by direct inhalation. The sufferings of a phthisical patient are sufficiently severe, without being aggravated by the interference of the empiric, who, ignorant of disease, as well as of the better feellings of our nature, prescribes for his own profit; supports his trade by mendacity, and increases his torturing exertions in proportion as his miserable patient approaches the couch of everlasting rest.

Palliative Treatment. — I shall here shortly allude to some of the more distressing symptoms, such as hectic, pain, cough, expectoration, hemoptysis, and diarrhœa.

The hectic is more a measure of the irritation than the suppuration of the lung. It will be often relieved or suspended by local depletion, by an hemoptysis, or by the adoption of a less stimulating regimen. When the hectic is severe in the early and middle stages the patient should stay as little as possible in bed. He should not sit during the day in his sleeping-room, which should be a large airy apartment. The chest should be sponged with tepid vinegar and water; frequent changes of linen are to be provided, a fresh garment being put on when the sweating commences; his diet must be of the least stimulating kind, and the digestive system carefully regulated. In a few cases, some of the preparations of bark answer well, particularly where the fever assumes an intermittent character; but we cannot persist long in their use. We cannot too strongly denounce the attempt to moderate the hectic sweating by medicines merely, without attention to other circumstances. If the season be mild, the patient should go out every day.

The pains are best relieved by a few leeches, or, what is as good, a small blister over the affected part, which may afterwards be dressed with the ointment of morphia. The application of turpentine, sprinkled on a hot cloth, will often succeed; and in many cases, the belladonna, or other anodyne liniments, will remove the pain. When, however, the pain is accompanied with the friction signs, the best treatment will be a few leeches or a blister.

There is a certain neuralgic affection of young females, which simulates the pain of phthisis. The patient complains of severe pain of one clavicle, generally the right; the pain is remittent or

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home, the prompt remedy for removing inflammation or any complication of the disease by one's own physician, and the solace of friends, will give the invalid advantages which neither Nice, nor Pisa, nor Rome, nor St. Augustine, nor Cuba, can procure for him.—B.]

intermittent, and accompanied with exquisite tenderness; the diagnosis is drawn from the absence of the stethoscopic signs of pulmonary or pleural irritation, the clearness on percussion, and the absence of constitutional symptoms. The value of these diagnostics is of course directly as the chronicity of the case.

In the course of a single case we must have recourse to various remedies to allay the cough. All the different forms of demulcents and opiates may be employed; of the latter, the most preferable are the different preparations of opium, hyosciamus, cicuta, and belladonna. Inhalations of the vapour of water, containing a narcotic extract, are often useful.

Where the cough resists these means, a few leeches applied to the trachea, on the principle advocated by Broussais, and more lately adopted by Dr. Osborne, will often give relief; and in some chronic cases, where even all these means fail, I have often found that the common antispasmodic mixture of camphor, valerian, opium, ammonia, and ether, gave the greatest relief.

But the greatest caution must be used in adopting measures to check expectoration, for it is the natural relief of the lung, and unless its quantity is so great as to run down the patient's strength, it should not be interfered with. Its arrest too often lights up new irritation in the lung, or produces the enteric complication. I have seen the most dreadful consequences from the use of stimulating inhalations, carelessly or too long employed. Those of which I have had much personal experience are the inhalations of iodine, chlorine, and tar. They all act in arresting the secretion of the lung, and are, consequently, hazardous. They have no specific action on tubercle, but, by arresting purulent secretion, they cause a more rapid development of the disease. I have seen the chlorine inhalations used in a number of cases, and always with bad effects; fresh irritations of the lung, pains of the side, tightness of the chest, sudden anorexia, diarrhœa, and sopor, have followed its use.

If there be any means likely to diminish the chance of injury from inhalation, it is the combining it with decided and extensive counter-irritation.

The experience of Meriadec Laennec, and of Dr. Forbes, is opposed to the use of chlorine. Why is it that medicine is still to be disgraced by publications similar to those in which we find this treatment recommended? publications, to use the words of Dr. Forbes, "alike unworthy of the notice of the honest pathologist and the philosophical physician."*

When hemoptysis occurs, its treatment must vary according to the accompanying circumstances. In the active variety, or that accompanied with much fever or excitement of the heart, our best treatment will be small general and local bleedings, the application of leeches to the feet, the internal use of ice, and the different

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* [Iodine by inhalation, from which more benefit has been confidently expected, is scarcely more efficient. — B.]

astringents, particularly sulphuric acid, alum, and the acetate of lead, in free doses.

The diarrhœa, proceeding, as it almost always does, from an enteritis, is best treated by attending carefully to regimen ; in the early stages, it can be generally commanded by the ordinary cretaceous and opiate medicines, but these soon lose their effect. We must then use the metallic astringents, combined with opium, and have recourse to small anodyne enemata; when even these fail, I have often seen the most marked advantage from the application of a blister to the abdomen. In many cases, the diarrhœa was permanently arrested, and the comfort of the patient materially improved.

DISEASES OF THE HEART.

LECTURE LXXVIII.

DR. BELL.

DISEASES OF THE HEART.—Position and structure of the heart—its valvular mechanism—Beat or impulse of the heart; when felt—Percussion—Various tones according to the part of the sternum struck—Auscultation—Two sounds of the heart; the first caused by the systole of its ventricles; the second by the resistance and sudden tightening of the semilunar valves—Different organic affections of the heart—Functional disorders—*Simple carditis*, a rare disease—Sequences of—Softening—varieties and causes of—Diagnosis not easy—Treatment, similar to that of pericarditis—Perforative ulceration and rupture—Recorded cases of and complications with.—*Aneurism, ventricular*—Thurman's summary of—Its precise seat and complications.—*Aneurism* of the auricles.

I CANNOT offer you more than a mere outline of the subject of the morbid states and the disorders of the heart; and even from attempting this within the limits of two or three lectures, I feel almost deterred when I look over the works of Laennec, Bouillaud, and Hope, the lectures by Dr. C. J. B. Williams, and the elaborate articles in the different Medical Dictionaries, both French and English, as well as the contribution of Dr. Joy in the Library of Practical Medicine, now before me. But a comparatively short period has elapsed since Corvisart, the favourite physician of Napoleon, was the only, as he was the earliest authority, entitled to any consideration on the diseases of the heart. After him came Bertin in France, and Testa in Italy, and connecting him with those who in our own day have done so much to make the pathology of the heart a part of demonstrative science.

For correct diagnosis of the diseases of the heart, we must be familiar first with its *position* in health in the chest, and then its healthy structure. The heart is placed in the anterior mediastinum, rather to the left of the mesial bone, and so oblique that the apex points forwards and downwards to the left, while the base lies back nearer the posterior centre, the spine. It, therefore, lies with its

point forwards on the diaphragm, underneath which are the liver and stomach; and it is bounded on other sides by the lung, except a small space of about two inches, where, enveloped in its coverings, it is in contact with the walls of the chest. Its base is directed upwards, backwards, and to the right side, looking towards the fifth, sixth, and seventh dorsal vertebræ, the esophagus and descending aorta intervening; and its point consequently downwards, forwards and to the left, answering in the erect posture, and in a medium state of distention, and the heart in the act of systole, to the fifth intercostal space, that is, in a middle-aged individual, to a point about two inches below, and one to the inside of the nipple; or two and a half from the base of the xiphoid cartilage. About one-third of the heart, consisting principally of the right auricle and the upper and right side of the base of the corresponding ventricle, lies behind the sternum. The orifice of the pulmonary artery and its valves, and consequently those of the aorta likewise, which lie posteriorly, but nearly in the same line, are placed immediately behind the upper edge of the sterno-costal articulation of the left side. A moderately-sized stethoscope, applied over the origin of the pulmonary artery, will cover also the aortic orifice and its valves, as well as a very considerable portion, nearly half of each of the auriculo-ventricular openings. The position of the heart is affected in a sensible degree by gravitation, and consequently by posture.

In *structure* the heart is known to you to be a compound hollow muscular organ, consisting of four compartments or cavities, lined with serous membrane and invested by a fibrous capsule, external to which is a serous membrane, that forms by reduplication the pericardium or heart-sac. The contraction of the heart and the direction in which it chiefly contracts will be understood after knowing the origin and insertion of its fibres. The greater number of these, or fleshy bundles, arise from and are inserted into the strong fibrous rings which form the auriculo-ventricular openings, or into tendinous prolongations from them. The contraction of all these muscular fibres is towards the auricular and arterial orifices, which are the most fixed parts of the organ, and the effect of the contraction must be to press the contents of the cavities towards these openings. Attached by the vessels at its base, and with its apex free, it is drawn together towards these vessels at each contraction; and the anterior surface being more convex, from the fibres being much longer than those behind, their contraction is greater, and the apex is, also, drawn forwards as well as upwards.

The valvular mechanism of the heart, so important for the discharge of the function of this organ, must be understood in order that we may appreciate the nature of its deranged and irregular contractions. The office of the semilunar valves is obvious enough, from their mere mechanical structure — attached by the whole of their convex ventricular margins, they fall loose and unresisting against the sides of the arteries at each gush from the ventricles; but no sooner does the gush cease, and the distended arterial

column press backwards, than their loose arterial margins are caught by the first turn of the refluent current, and they are distended into three sacs, the free sides of which being in close contact completely intercept the passage of blood back into the ventricles. This action is merely mechanical, and can be produced in the dead body; it will be more perfect in proportion as the backward pressure from the arteries is greater. The auriculo-ventricular valves on the other hand, will not act well after death: their office depends on the vital contraction of the fleshy columns, to which their cords are attached, as well as on the mechanical spread of their laminæ. On the right side we see the irregular triangular curtains of the tricuspid valve, which are drawn in succession, one somewhat behind its neighbour. When the right ventricle is much distended, these curtains do not entirely reach across the orifice; and regurgitation takes place. This seems to be a provision against an excess of pressure on the pulmonary vessels, and induced Mr. Adams of Dublin first to call this valve a safety-valve.

The heart in action, communicates its *beat or impulse* perceptibly to the person making an examination, when his hand is applied to a particular part of the chest, viz., to the left front between the fourth and sixth ribs, and about two inches below and in front of the left nipple in males; but they vary remarkably, both in strength and extent, according to the stage of the respiratory act and the posture of the body, as well as from differences in their own strength. Modifications will also occur from tumours and effusions of liquid or air into the pleura, and even from abdominal tumours and a distended stomach. The greater thickness and strength of the left ventricle make its motions more forcible and extensive than those of the right; and it is perhaps, as Dr. Williams, whose description I am now transferring for your behoof, suggests, that for this reason this ventricle is placed to act chiefly on the soft cushion of the lung, which offers no unpleasant resistance to it.

Percussion is the next means of examining the region of the heart. It is performed by striking on the back of one or two fingers firmly applied on the chest, with three fingers of the other hand slightly bent, either on the ribs, which is better, or the intercostal spaces if necessary. This is the plan adopted for the last seven or eight years of his life by Dr. Hope. It is scarcely necessary, he adds, to say that percussion over a solid, as the heart, where it is in contact with the walls of the chest, elicits a dead sound; while that over a body containing air, as the lungs, stomach, &c., produces a hollow sound. It is less generally known, that a solid beneath a body containing air, as the liver beneath the edge of the lung, the outline of the heart beneath the lung that overlaps it, &c., may be recognised by a sound intermediate between hollow and dead. Having tried the experiment before several individuals placed at remote parts of a spacious room, Dr. Hope found that they readily distinguished the full hollow tone of the middle lobe of the lung, the duller intonation of the lung overlapping the heart or liver, and the dead sound of the precordial region, where

the heart is in contact with the walls of the chest. In a well constituted chest of a person who was fat, there is commonly some dulness on percussion from the left margin of the sternum to the extent of between one and two square inches towards where the impulse is felt; but this dulness is remarkably diminished, if not quite removed, by a leaning back or supine posture, and by taking a full inspiration; and it is as notably increased by leaning forwards and to the left and by a forced expiration. If variations in these respects are not observed we have at once probable evidence of some morbid condition of the heart either by adhesions or pericardic effusion. When the heart is enlarged, as by hypertrophy, dilatation, fat, or even temporarily by congestion, the descent of the lungs being impeded, the dull portion increases, and may attain the diameter of three, four, or, in extreme enlargement, even five inches. The centre of the dulness generally lies between the cartilages of the fifth and sixth ribs; but in great enlargement it lies lower, as between the sixth and seventh ribs. In copious hydropericardium, Dr. Hope has known the dulness ascend under the sternum, in the conical form of the sac as large as the level of the second rib; and he has repeatedly traced the gradual descent of the dulness in proportion as the fluid was absorbed.

The next evidence of the degree and kind of the heart's action is procured by the sense of hearing — or by *auscultation*. By listening either with the stethoscope, or with the ear alone applied to the region of the heart, you hear at each pulse two sounds following each other in quick but regular succession, and succeeded by an interval of silence until the next pulsation. The first is a long, rather dull sound; the second a short, abrupt flap; they are compared by Dr. Williams to the articulate sounds *lubb dup*. After many and varied experiments, and much discussion not always conducted with philosophic coolness, it is now decidedly ascertained that the first sound accompanies the whole duration of the systole of the ventricles, which also causes the impulse felt on the walls of the chest; and it is also rendered equally clear that the second or flapping sound occurs at the first moment of the diastole. The motion of the auricles is accompanied by a slightly perceptible sound, according to Dr. Pennock and Moore (*Experiments on the Heart, &c.*). Various opinions have been held respecting the causes of these sounds. The first sound is attributed by Dr. Hope to muscular extension, by which he means a loud, smart sound, produced by the abstract art of sudden jerking extension of the already braced muscular walls of the ventricle, at the moment when the auricular valves close; 2, to muscular or rotatory muscular sound — *bruit musculaire où rotatoire* — the dull rumbling sound of muscular contraction; 3, the sound of valvular extension the most important of all. Dr. Williams refers the first sound or ventricular systole to a vigorous and rapid motion suddenly resisted by the mass of blood to be urged forwards by the contraction. In other instances abrupt and forcible contraction produces a sound like the first sound of the heart. If the end of a flexible tube be

applied at the abdominal muscles, and these be started into sudden vigorous action, one can hear sounds quite as loud as those of the ventricles, and very like them in character. By varying the mode of muscular contraction different kinds of sounds may be obtained. The second sound is believed by Dr. Hope, and by Drs. Pennock and Moore (*Hope on the Heart*, edited by Dr. Pennock), to be produced by the closure of the sigmoid valves exclusively; by Dr. Williams, to be owing to the sudden tightening of the semilunar valves at the mouths of the arteries (aorta and pulmonary artery). The first sound, the impulse and the ventricular systole are synchronous. The second sound is synchronous with the diastole of the ventricle. The auricular systole, as we learn from Drs. Pennock and Moore (*op. cit.*), is attended by a slight intrinsic sound which is absorbed in or masked by that of the louder sound of the ventricular contraction.

With this preliminary knowledge of the normal situation and action of the heart, we are better prepared to investigate the morbid changes, numerous and diversified as they are, of this organ. Those which first engage attention, both on account of their frequency and the new products to which they give rise, causing thereby additional complication and more diversified sympathetic disturbances, are inflammations. The inflammatory affections of the heart are arranged according to the tissues and organic structures affected. Inflammation of the muscular substance and intermediate cellular tissue of the heart is *Carditis;* that of its lining membrane *Endocarditis*, of its investing membrane *Pericarditis*. Carditis may give rise to *softening*, *induration*, and *dilatation* of the heart's substance. *Hypertrophy* may be the result of a slow inflammation, as chronic pericarditis; but still more common from this last cause are serous effusions, *hydropericardium*, and sometimes secretion of coagulable lymph and even pus. Consentaneous with endocarditis, and sometimes occurring separately, are different *structural changes in the valves;* as inflammation, thickening, contraction, ossification, ulceration, and vegetations.

Other diseases of the heart disturbing its function without any notable change in the organ itself, are designated by the rather vague term nervous. The chief of these are neuralgia, palpitation commonly of a secondary nature, and spasms. Palpitation occurs under two different states; the one of increased, and the other deficient action of the heart. The latter often accompanies syncope. The remote disorders of function from organic disease of the heart's are both numerous and important, and interest all the other primary organs of the body, viz., the brain by apoplexy; the lungs by asthma, hydrothorax, &c.; the liver by congestion and enlargement; the aorta and its chief branches by abnormal pulsations; the veins by retarding the return of blood in them, and causing anasarca at one time, ascites at another.

The heart is not always the active cause or originator of functional disorders: it is not seldom the recipient of irritation from other organs to which it responds, often with extreme vivacity. In fevers its disturbed function is one of the chief characters of these diseases, and for a long time was supposed to constitute the greater part of fever itself; but an amended pathology has shown us that cardiac disease is, in general, no more than a symptom, a very important one indeed, but still a symptom. Less alarming but exceedingly harassing disorders of the heart, responsive to those of primary origin in some other organ, are continually met with in practice; the violence of which, however, is often compounded of the lesion of the remote organ and the original or constitutional susceptibility of the individual, by which at every hour, on the slightest exciting cause, more than the common routine of life, the heart throbs with violence and beats against the sides of the chest, producing by itself so much distress as to mask in part and sometimes entirely the original lesion or irritation in the remote and primarily offending organ. The observing physician sees continual examples of this combination of disorders in certain forms of dyspepsia and hypochondriasis, as well as in chlorosis and anæmia, which, by the hasty and superficial inquirer, might be supposed to indicate some fixed organic disease of the heart; or if the latter be of the sentimental school, he may regard them as evidences of a mind ill at ease, whose refined sensibilities the rough world is unfitted to understand and appreciate. But, as neither time nor room is allowed for discursiveness, even on affairs of heart, as they come before the lecturer on medicine, I must pass on to the fulfilment of my purpose, which is, to make a few practical remarks, resting on a pathological basis, respecting the chief organic and some of the functional diseases of this organ, mentioned in the kind of syllabus which I sketched for you a few minutes ago.

Carditis, once used as a term indicative of all the diseases of the heart of an inflammatory nature, without specification of part or appendage, is now properly restricted to phlogosis of the muscular and cellular tissues of the substance of the organ. True carditis is a rare disease; its existence even has been denied by Laennec. This is too extreme an opinion. Cases, though few, are sufficiently attested, as in that one by Dr. Latham, in which the whole heart was deeply tinged with dark-coloured blood and its substance softened; and here and there, upon the section of both ventricles, innumerable small points of pus oozed from among the muscular fasciculi. Corvisart, who never met with a case of carditis in an uncomplicated form, gave, in addition to three cases of his own, six from Meckel, Storck, and Hildanus, in all of which pericarditis existed at the same time. Partial inflammation, characterized by abscess or ulceration, is of occasional occurrence. Abscesses are more rare than ulcers. The latter occur both on the internal and external surfaces of the heart, and are consequent on inflammation of their respective membranes. The diagnosis of

simple carditis cannot well be made. As generally seen, the disease is complicated with disease of the heart's membranes, and its treatment will be the same as that of the latter.

M. Bouillaud arranges the cases of carditis under the three following heads: those terminating in softening (*ramollissement*), or suppuration; 2, those terminating in ulceration, perforation, and rupture of the walls of the heart, or of the columnæ carneæ, tendons, or valves; those ending in ulceration, with the consequent formation of aneurism; 4, those leading to induration in various degrees up to a fibro-cartilaginous or cartilaginous consistence, or even to perfect ossification, as in Burn's remarkable case. Softening is described by Dr. Hope (*op. cit.*) as presenting itself under the colours of *red*, *yellow*, and *whitish*; each of which may be inflammatory or not. In the case already referred to and recorded by Dr. Latham, the whole substance of the heart was softened. But both red and white softening have been met with by Dr. Hope, where there was a retardation of the venous circulation through the muscular substance, as in dilatation with attenuation, great obstruction of the mitral, and occasionally of the tricuspid valve. This condition, softening with redness, sometimes met with in typhous fever, has been by Bouillaud attributed to inflammation. Laennec refers it to the alteration or putrescence of the fluids, an opinion in which he is joined by Dr. Hope. M. Louis has met with it in typhus; and it is described by Dr. Stokes as occasionally existing in this fever, and, as constituting a condition of the organ which requires stimulation, as the administration of wine, &c. *Yellow* softening is represented by Dr. Hope to be more common than either the red or the white; it may pervade the whole or portions only of the heart, and may coexist with hypertrophy, dilatation, or other lesions of the muscular substance. This like the red may be inflammatory, or may occur independently of inflammation.

The *diagnosis* of softening of the heart is not easy. Suspicion of its existence will be entertained when the impulse is more or less reduced in strength, the beats intermittent and irregular, and of unequal force; the pulse being of the same nature at the time. It is true that the same character of pulse with that just described accompanies disease of the mitral valve. The distinction between the two is thus described by Dr. Hope:—"If after an exploration suitably conducted, no murmur be found to attend either sound of the heart, the irregularity of the pulse may be ascribed to softening, provided it be not referrible to temporary nervousness, to a paroxysm of dyspnœa, or to ebbing of the vital powers on the approach of dissolution — all of which circumstances are capable of producing transitory weakness and irregularity of the pulse, even in a healthy heart." p. 328–9. Hypertrophy, which complicates the diagnosis, is no uncommon accompaniment of softening of the heart; and in two of the three cases introduced by Dr. Hope in his work there was at the same time pulmonary apoplexy.

The *treatment* of softening when accompanied by acute inflammation is conducted on the same principles as those which would govern us in pericarditis. When a result of chronic disease, it demands the same remedies as the primary affection; and these are often of a tonic nature, such as iron, quinia, nutritious animal diet, and good air. Complete cessation of palpitation is not to be expected till anæmia is removed, for this alone is capable of maintaining the symptom; nor, adds Dr. Hope, is a diminution of coexistent inflammation to be looked for till a restoration of the tone of the general muscular system and a decrease of the physical signs of softening denote that the heart has recovered somewhat of its natural tone and elasticity. To the existence of softening of the heart in typhous fever, I have already referred; and also of its furnishing an indication for the use of various stimulants, and, I may now add, of quinia.

Coincident, at times, though not necessarily so, with inflammatory softening of the heart, is perforative ulceration and rupture of the organ, which last, happily a rare termination, is a fatal one. Signs of abscesses and ulcers vary in different subjects, and are not distinguishable from those of other affections. Ulceration is the most frequent cause of rupture of the heart, which may take place, however, in consequence of softening of the muscular tissue. These forms of disease with rupture are much more frequent on the left than on the right side of the heart; and, as M. Breschet asserts, more on the apex of the left ventricle than elsewhere; but M. Reynaud found, in opposition to this view, that in seven out of thirteen cases analysed by him the disease did not occupy the apex. The exciting causes of rupture are, generally, considerable efforts, paroxysms of passion, external violence, falls, &c.

Corvisart was the first who noticed and described cases of rupture of the fleshy columns and tendinous cords of the heart. Laennec and Bertin have each met with an instance of the same. Violent efforts, as coughing, were the cause. The symptoms were, sudden and very suffocating dyspnœa, with overwhelming faintness, paleness and coldness, followed by all the general phenomena of disease of the heart. Rupture of the heart or great vessels into the pericardium, is not always immediately fatal, as a solid coagulum or a fibrinous condition has in several instances been known to arrest the hemorrhage for a few hours. Of ten cases mentioned by Bayle eight died spontaneously, one in about two hours, and another in fourteen. Dr. Pennock, the intelligent editor of Dr. Hope's work on the heart, refers to a communication by Dr. Hallowell (*Am. Jour. Med. Scien.*, 1835) on rupture of the heart, in which he (Dr. H.) reports two cases occurring under his own observation in the Salpètriere at Paris. The number of well-attested cases of rupture of the heart amounts perhaps, by Dr. Hallowell's computation, to sixty. Of these he has given an analysis of thirty-four, in which it is stated, that the patients had been affected for a greater or less length of time with palpitations, and had experienced frequent

attacks of lipothymia, or complained of pain beneath the sternum, and tightness and weight across the chest. Usually the accident has occurred to persons advanced in life. Sixteen of the thirty-four individuals were males, and eighteen were females.

Aneurism is another sequence of inflammation of the heart, by this last causing either ulceration or softening and yieldingness of the muscular tissue. The best summary on this head is by Mr. Thurman (*Medico-Chirurgical Transactions*, vol. xxi., 1838), who is largely quoted by Dr. Hope. Mr. Thurman has collected together seventy-four cases. Lateral aneurism of the left ventricle is represented by this gentleman to be met with under two principal forms, viz., 1, unattended by any external deformity of the heart, and confined altogether to the ventricular walls: or, 2, it may present itself in the form of a tumour growing from the exterior of the organ, and in size varying from that of a nut to that of the heart itself. In sixty-seven aneurisms, occurring in the fifty-eight cases, thirty-four were attended by tumour; in nineteen there was no tumour; and in the remaining thirteen, it is doubtful whether tumour existed or not; although, from the small size of the sacs in these latter cases, it is probable that the disease scarcely extended beyond the surface of the ventricles. With respect to the tissues of the heart engaged in the formation of the aneurismal sac, a careful analysis of the cases would seem to show that, in fifteen, the sacs were formed by the muscular fibres and pericardium; in four, by the endocardium and pericardium only; in twenty-five, in all the structures entering into the composition of the walls of the heart; whilst, in twenty-three cases, the disease was either too far advanced, or the data are insufficient to enable us to assign them to their proper places. The parts of the left ventricle most affected with aneurism are the thinnest parts of its walls or the apex, and the highest part of the base. Lateral aneurism of the heart should, Mr. Thurman thinks, be regarded as the effects of inflammation, but not in any one tissue exclusively. The number of cases in which the heart is not stated to have been the seat of some lesion (hypertrophy, dilatation, &c.) in addition to the aneurism, does not exceed ten; and in three only is it positively stated to have been otherwise healthy. As respects the influence of sex, in forty cases, in which this is recorded, thirty occurred in males and ten in females. The proportion thus met with in the female is much greater than is found to be the case in arterial aneurisms, which, according to Hodgson, occur eight, and, according to Lisfranc, eleven times oftener in the male than the female. There can scarcely be a doubt, Mr. Thurman thinks, that, as in the case of other organic diseases of the heart, so it is of aneurism, acute rheumatism affecting this organ, either in the form of endocarditis or of pericarditis, is to be regarded as closely connected with the production, if not as the efficient cause of this lesion. If this view should prove to be correct, we shall have no difficulty in explaining the greater frequency of arterial aneurism during early life; as it is well known that

the progress of acute rheumatism, the inflammatory affections of the heart which have been alluded to, occur much oftener at this than at any other period.

The symptomatology and diagnosis of aneurism of the heart are not by any means clear. In a great majority of cases, the disease would seem to have a very insidious origin, and to have been only very gradually announced by symptoms. There are after a while undoubted symptoms of diseased heart; but in the specification of the precise part diseased, and the kind of disease, consists the difficulty stated by Mr. Thurman, and admitted by M. Bouillaud as well as by Dr. Hope.

Aneurism of the Auricles. — In all the cases which have come to Mr. Thurman's knowledge, whether in the sinus or appendage of the auricle, and which are nine in number, the disease was connected with, and appears to have been dependent upon, an extreme contraction of the mitral orifice, producing a difficult transmission of blood from the left auricle. The number of cases of aneurismal dilatation which are recorded as having occurred in the left auricle, is much less than that which we have seen to be the case in the ventricle.

LECTURE LXXIX.

DR. BELL.

HYPERTROPHY OF THE HEART.—Divisions of hypertrophy—Average dimensions of a healthy heart—Dr. Clendinning's and M. Bizot's measurements—Anatomical characters and volume of a hypertrophous heart—Exciting causes—Different forms and complications of hypertrophy—Connexion between hypertrophy and cerebral disease, particularly apoplexy—Ossification of the cerebral arteries—Capillary congestion of the mucous membranes and liver—Serous infiltrations and congestions; disease of the kidneys in hypertrophy of the heart—Palpitation—Impulse heard through the stethoscope—Hypertrophy with dilatation—Sounds of the heart and state of the pulse in hypertrophy—Arterial pulse; its cause and characters; modifications by hypertrophy—Causes commonly affecting the pulse—Signs of hypertrophy of the right ventricle.—*Treatment* of hypertrophy—Abstraction of blood short of producing anæmia—Moderate and frequent abstractions to be preferred.—Purgatives and diuretics—Dropsy, its organic causes and consequent pathology—Treatment of—Perseverance in treatment of hypertrophy all important.

HYPERTROPHY. — Bertin was the first writer who entertained clear ideas of the varieties of hypertrophy of the heart, which, with Dr. Hope, we may define to be an augmentation of the muscular substance of the heart, resulting from increased nutrition. The varieties indicated by the French writer are laid down by Dr. Hope, as follows: — 1. *Simple hypertrophy*, in which the walls are thickened, the cavity retaining its natural dimensions. — 2. *Hypertrophy with Dilatation.* This (the *eccentric* or *aneurismal hypertrophy* of Bertin) presents two sub-varieties, viz. — A. With the walls thickened, and the cavity dilated. B. With the walls of natural thick-

ness, and the cavity dilated; *i. e.*, hypertrophy by increased extent of the walls. — 3. *Hypertrophy with Contraction.* In this (the *concentric hypertrophy* of Bertin) the walls are thickened, and the cavity is diminished.

Before speaking of the morbid growth of the heart, in which, of course, we meet with abnormal dimensions and weight, we ought to have a standard of health for the purposes of comparison. Of late years weights and measurements have been made by M. Bouillaud (*op. cit.*), by Dr. Clendinning (*Brit. Med. Almanac*, and his *Croonian Lectures* for 1838), and with still more minuteness and variety of specification by M. Bizot (*Mem. de la Société Médicale d'Observation de Paris*, 1837). Dr. Clendinning has "attempted to obtain averages accommodated to the advancing development of the organ." He estimates the average weight of the heart to be —

	Males.	Females.
15 to 30 years	8¼ oz.	8⅐ oz.
30 to 50 „	8½ „	8½ „
50 to 70 „	9⅓ „	8 „
70 and upwards	9¾ „	8 „

In his lectures, Dr. Clendinning says: the normal heart may be assumed to average for the whole life, above puberty, about 9 ounces in absolute weight, and 7½ ounces, or a little more in bulk, for the female; and to bear after death to the person, for the male, the rate of about 1 to 160; and for the female, of 1 to 150. This statement is the result of an examination and weighing of nearly 400 hearts. Sex, as you have learned from the preceding calculations, has a decided influence upon the size of the heart. Under all circumstances, as remarked by M. Bizot, the size of the female heart is found to be less than that of the male. The heart, unlike the muscles of animal life, unlike, also, the greater part of the other organs, which become atrophied with age, continues to grow and increase. Old age, continues M. Bizot, is the epoch in which the heart has the largest volume. It is, positively speaking, not only more voluminous at that period, but it is absolutely greater in relation to the size of the body generally. Stature modifies the volume of the heart, which is rather less in tall persons of either sex than in short ones. The proportions of the relative capacity of the ventricles in all ages are relatively the same. The capacity of the ventricles increases with age, and the thickness of the walls of the left ventricle increases in the same ratio or that of age, while those of the right ventricle remain very nearly stationary. In the fœtus the thickness of the two ventricles is nearly the same; at birth the left is a little thicker; and with the advance of age the disparity between the two ventricles increases. Hence, as M. Bizot very truly remarks, we cannot but see, that, to take the thickness of the wall of the right ventricle as a term of comparison, as has been generally done, in order to estimate the proportional thickness of

the wall of the left ventricle, is the most defective means possible. The two following tables give the thickness of the walls of the two ventricles: —

MALES.	Lines.			FEMALES.	Lines.		
Ages.	Base.	Middle.	Apex.		Base.	Middle.	Apex.
1 to 4	3	$2\frac{9}{10}$	$1\frac{9}{19}$		$2\frac{9}{16}$	$2\frac{7}{8}$	$2\frac{1}{16}$
5 to 9	$3\frac{1}{3}$	$3\frac{5}{6}$	$2\frac{2}{3}$		$3\frac{1}{20}$	$3\frac{1}{10}$	$2\frac{3}{10}$
10 to 15	$3\frac{2}{3}$	$3\frac{5}{6}$	$2\frac{1}{3}$		$3\frac{3}{10}$	$3\frac{2}{5}$	$2\frac{2}{3}$
16 to 29	$4\frac{2}{9}$	$3\frac{7}{9}$	$3\frac{4}{9}$		$4\frac{2}{7}$	$4\frac{7}{13}$	$3\frac{5}{28}$
30 to 49	$4\frac{17}{46}$	$5\frac{1}{11}$	$3\frac{13}{23}$		$4\frac{1}{9}$	$3\frac{27}{54}$	$3\frac{6}{27}$
50 to 79	$4\frac{37}{38}$	$5\frac{29}{38}$	$4\frac{1}{29}$	50 to 89	$4\frac{1}{2}$	5	$3\frac{1}{4}$
Medium from 16 to 79	$4\frac{65}{122}$	$5\frac{19}{122}$	$3\frac{95}{122}$	16 to 89	$4\frac{3}{8}$	$4\frac{4}{5}$	$3\frac{13}{30}$

MALES.			FEMALES.		
Ages.	Base.	Middle.	Apex.	Base.	Middle.	Apex.
1 to 4	$\frac{9}{10}$	$\frac{6}{10}$	$\frac{5}{10}$	$1\frac{3}{36}$	$\frac{7}{8}$	$\frac{13}{24}$
5 to 9	$1\frac{1}{3}$	$\frac{5}{6}$	$\frac{5}{6}$	$1\frac{3}{16}$	1	$\frac{7}{16}$
10 to 15	$1\frac{1}{3}$	$1\frac{1}{6}$	$\frac{5}{6}$	$1\frac{7}{20}$	$1\frac{3}{10}$	$\frac{9}{10}$
16 to 29	$1\frac{27}{38}$	$1\frac{8}{19}$	$1\frac{1}{19}$	$1\frac{4}{7}$	$1\frac{2}{7}$	$\frac{25}{28}$
30 to 49	$1\frac{39}{46}$	$1\frac{7}{23}$	$\frac{45}{46}$	$1\frac{19}{22}$	$1\frac{13}{54}$	$\frac{24}{27}$
50 to 79	$2\frac{1}{19}$	$1\frac{53}{68}$	$\frac{81}{84}$	$1\frac{1}{4}$	$1\frac{1}{4}$	1
Medium from 16 to 79	$1\frac{113}{122}$	$1\frac{99}{244}$	$1\frac{2}{61}$	15 to 59 $1\frac{2}{3}$	$1\frac{7}{24}$	$\frac{67}{720}$*

The anatomical character of hypertrophy consists in the muscular substance of the heart being usually firmer and redder than natural. But in anæmic subjects we may expect to meet with flabbiness and paleness of texture — the states which prevail in the muscular system generally. Firmness existing in a great degree constitutes *induration*, a distinct affection, dependent not so much on increased as on altered nutrition of the part, the elementary particles being denser than natural. It is generally attended with hypertrophy. This morbid condition, or hypertrophy, may be confined to a single cavity, or may simultaneously affect several, or even the whole. Sometimes one cavity is thickened, while another is attenuated. When all the cavities are hypertrophous, and at the same time dilated, the heart attains a volume, two, three, and occasionally even four times greater than natural; and its weight, properly eight or nine times, may be thrice as much. A case, continues Dr. Hope, was met with lately at St. George's, in which it was two pounds and a half. The left ventricle, being more prone to thickening and not less to dilatation than the right, sometimes attains a volume seldom or never acquired by the right; and when its enlargement is very great it occupies not only the left pericardial region, but extends far under the sternum, where its impulse and sound may be mistaken for those of the right ventricle. The situation of the greatest thickening is usually a little above the middle of the ventricle, where the *columnæ carneæ* are inserted. The cavity of the hypertrophous left ventricle is sometimes dilated

* See Dr. Pennock's valuable note, in his edition of Hope.

to such a degree as to admit the largest orange, or the fist of an adult. I have twice, says Dr. Hope, during the last six months, seen it exceed even these dimensions. On the contrary, in hypertrophy with contraction, the cavity may be reduced to the size of a small walnut or a pigeon's egg; in Bouillaud's case it could scarcely contain the finger. The cavity of the right ventricle, naturally a little larger than a hen's egg, may be dilated to the size of a goose's egg or more; or it may be contracted to less than a pigeon's egg. In Bouillaud's case 65, it could scarcely contain the thumb; and in case 123 the *columnæ carneæ* was so thickened and adherent that there was scarcely any cavity left, and the blood could only filter through the narrow spaces between them. Hypertrophy may be not only confined to a single ventricle, whether the right or the left, but it may be confined to particular parts only, as the base, the septum, the apex, the *columnæ carneæ*, or the external walls, the remainder of the cavity being either natural or attenuated. The *hypertrophy of the auricles* is almost invariably of the second species, or that with dilatation.

The *exciting causes* of hypertrophy are either of a nervous or of a mechanical nature. Under the first head are included all moral affections, and all derangements of the nervous functions that excite long continued palpitation. The second embraces all those causes which can either accelerate or obstruct the circulation, and thus occasion a preternatural pressure of the blood upon the heart; such are violent and sustained corporeal efforts of every description. These violent exercises may even occasion rupture and inflammation of the valves and aorta, issuing in incurable organic disease. It is *protracted* efforts that are, in Dr. Hope's opinion, always the most pernicious. Malformation of the chest, either congenital or occasioned by curvature of the spine, encroachment of the diaphragm on the cavity of the chest from the pressure of the gravid uterus, of ovarian dropsy, of other abdominal tumours, but perhaps above all, continues Dr. Hope, of long, stiff, stay bones, or wooden *busks*, which, by fixing the abdomen, prevent the descent of the diaphragm, are so many causes of hypertrophy of the heart. Mechanical obstacles to the passage of the blood from the aorta, as valvular disease or extreme smallness of this canal, are also, occasional causes. Inflammation of a contiguous serous membrane, as of the pericardium or pleura, is also a not unfrequent cause; although not to the extent asserted by Bouillaud, who tells us that it is almost always complicated with chronic pericarditis or endocarditis, or their consequences. Dr. Clendinning tells us, that in upwards of five hundred autopsies made by him of patients dead of various diseases, above one hundred and seventy, or above a third of the whole number, proved to have had heart disease in some form or other. Five-sixths of these were, he says, cases of hypertrophy uncomplicated with other diseases of the heart, such as pericarditis, endocarditis, or valvular disease. In about thirty cases only, or in about one-sixth of the whole, was well-marked valvular

disease detected; in all these last cases, with but one exception, hypertrophy existed.

The frequency of the various forms and complications of hypertrophy and dilatation is expressed in the following scale by Dr. Hope: —

1. Hypertrophy with dilatation of the left ventricle, and a less degree of the same in the right.
2. Hypertrophy with dilatation of the left ventricle, with simple dilatation of the right.
3. Simple dilatation of both ventricles.
4. Simple hypertrophy of the left.
5. Dilatation with attenuation of the left.
6. Hypertrophy with contraction of the left.
7. Hypertrophy with contraction of the right.

The *effects* of hypertrophy merit serious consideration. Among the first of these are capillary congestion, by the increased force and activity of the circulation, and serous infiltration. The sensibility of the organs will be exalted, and they will be rendered more liable to inflammation, serous effusion, and hemorrhage. Hence apoplexy and phrenitis, epistaxis, ophthalmia, and other inflammatory affections of the parts of the body, have been traced to this form of disease of the heart. The connexion between hypertrophy of the left ventricle and apoplexy is clearly made out by Bouillaud, Hope, Bricheteau, and others. Of fifty-four cases of hypertrophy detailed by M. Bouillaud, eleven, that is about one-fifth, present the coincidence of cerebral hemorrhage or softening of the brain; and this in individuals of various ages, from twenty-five up to seventy-nine. Dr. Hope's cases of apoplexy, thirty-nine in number, at the St. Mary-le-bone Infirmary, between December 12th, 1832, and the same date 1834, exhibit a coincidence in twenty-seven of hypertrophy of the heart; or 9–13, nearly three-fourths of the whole. The ages at which these conjoined diseases proved fatal are not such as might *à priori* have been anticipated. Dr. Hope presents the following estimate on this score: —"Between birth and forty years, disease of the heart was not found in any of the four fatal cases that occurred within these dates. Between forty and fifty, it occurred in eight out of nine! — a remarkable increase. Between fifty and sixty, it occurred in four out of five — a decrease. Between sixty and seventy, it occurred in three out of seven — a further decrease; and between seventy and eighty, it occurred in ten out of eleven! — another remarkable increase. It would thus appear that the periods of life during which fatal apoplexy is most prevalent are precisely those in which concomitant disease of the heart is of most frequent occurrence; namely, between forty and fifty, and between seventy and eighty."

M. Bricheteau (*Journ. Complem. du Dict. des Scien. Med.*, 1818,) relates twenty cases of the coincidence between apoplexy and hypertrophy of the left ventricle, and draws the same conclusion with Dr. Hope respecting the ages at which death from this con-

junction of cardiac and cerebral disease are most liable to occur. Lallemand (*Recherches Anatomico-Pathologiques sur l'Encephale et ses Dependences*) gives several cases in which the two diseases were conjoined with fatal effect. In his Lettre 1re, Observation XII., in a note, he points out a very important circumstance in the pathology of ventricular hypertrophy, viz., the contraction of the semilunar valves, which, he thinks, is the most common cause of cardiac hypertrophy, or aneurism, as he terms it. If this obstruction exist, distressing effects indicated by appropriate symptoms follow; but apoplexy or cerebral oppression is not among the number. The fact in a more modified shape is admitted by Dr. Hope (p. 261). We have a bluish colour of the lips and cheeks, infiltration in the cellular tissue of the limbs, symptoms indicating a venous congestion, which are wanting for the most part in hypertrophy without any valvular obstruction.

It has been suggested (*Med. Gaz.*, 1835,) that "the true explanation of the hemorrhage in the brain is to be found in the diseased state of the cerebral arteries;" but this is assuming an occasional complication, it may be cause, for a fixed and determining one. We shall be obliged either to deny its force, or else to be able to detect a morbid state of the arteries in other organs, as in the lungs, for example, in which hemorrhage is an occasional effect of cardiac hypertrophy. But the coincidence between apoplexy and a diseased state of the arteries of the brain, particularly those at the base of this organ, has not been overlooked. Dr. Hope pointed it out in the first edition of his work. Still, we must admit, that ossification of the cerebral arteries, which is sometimes met with in extreme old age, is not incompatible with life and the possession of the mental faculties.

It has been already stated that the brain is diseased in various ways by persistent hypertrophy of the heart. The history of individuals affected with it, not unfrequently presents a striking narrative of violent headaches, brain fevers, various inflammatory complaints, and states of great nervous irritability and excitement. This remark, adds Dr. Hope, has been corroborated by the recent researches of Dr. Clendinning, his successor at the St. Mary-le-bone Infirmary. As the ophthalmic artery is derived from the carotid within the cranium, the eye participates with the brain in the effects of hypertrophy, and is vascular, brilliant, and prone to ophthalmia. The wasting away of the eye which Professor Testa (*Malattie del Cuore, &c.*) has remarked as one of the effects of disease of the heart, is with good reason supposed by MM. Bertin and Bouillaud to be connected with ossification of the ophthalmic arteries.

Capillary congestion of the air-passages is a common effect of cardiac disease, whether it be hypertrophy, or dilatation without hypertrophy. The mucous membrane is injected and reddened; and consequent upon this organic change are functional embarrassment, as hurried breathing, catarrhal and bronchitic disorders, with cough and dyspnœa. Sometimes blood is mixed with the sputa,

and even a pulmonary apoplexy may supervene — a result already described to you as not uncommon, when I was speaking of hemoptysis or bronchial hemorrhage (Lect LXVI., p. 222–223). I may take this occasion to point out for correction a contradiction to this view, in my attributing pulmonary apoplexy to hypertrophy of the right side of the heart. The evidence, except in that adduced by M. Louis soon to be mentioned, is all in favour of the left being the offending and suffering side of the heart. The lungs in general are implicated with cardiac disease, manifested either by serous infiltration or œdema. Emphysema of the lungs is also one of the most noticeable lesions which accompany diseases of the heart. Generally, anterior to the latter, it is however sometimes consecutive, as when it is the result of prolonged efforts made for the inhalation of air.

Congestion of the digestive mucous membrane, also, is distinctly indicated by M. Andral as a common sequence to diseases of the heart. Commonly it is mere obstruction, but at times it is converted into real inflammation. The liver is very frequently much congested, especially when the disease occupies the right cavities of the heart. With greatly augmented size we find the liver of a deep red and gorged with blood, which flows out freely on the slightest pressure. During life the enlargement of the organ is quite manifest, descending as it often does below the false ribs. A copious bloodletting, or other sanguineous evacuation, will sometimes suffice completely to remove this swelling. The spleen, sometimes more voluminous and engorged with blood than natural in heart disease, is, however, more generally small, denser, and even harder than in its normal state.

Serous congestions and infiltrations from cardiac disease are met with in the cellular tissue and the serous cavities. The first appearance is a slight puffiness about the ankles, which gradually extends upwards, until a dropsical effusion occupies the whole sub-cutaneous cellular tissue. The face is early swelled ; sometimes the hands and arms are swelled at the same time with the ankles ; but the infiltration of the upper extremities is less seldom met with than that of the lower ones. Of the serous membranes, the peritoneum is that which is most frequently filled with effused serum in organic affection of the heart. Ascites only shows itself, however, after infiltration of the cellular tissue of the lower limbs. Serosity in the pleura and pericardium is much less frequent ; and in the arachnoid it has not been seen at all. It is worthy of remark, that both serous congestions and anasarca sometimes disappear in a short period ; but they return somewhat later in the disease.

The strong and sustained contraction of the ventricle, by sending more blood, and with additional impetus, to the different tissues, may so far modify their nutrition as to cause an augmented growth. Proof of this change is met with in the kidneys, which in cardiac hypertrophy of long standing are generally found enlarged and otherwise diseased, and often presenting the granular change of

structure and albuminous deposit in the urine described by Dr. Bright, and on which I have, on a former occasion, adequately enlarged (Lect. LII. and LIII.).

In thus describing effects, I have indicated some of the chief secondary or functional and general symptoms of hypertrophy of the heart. The direct organic or local and physicial ones are now to be designated; and under this head I shall include those which are the immediate evidences of the morbidly excited action of the heart, such as palpitation, pulse, &c. The chief of these are, according to M. Bouillaud, the disordered actions of the heart itself, viz., an augmentation of the force and extent of its pulsations, and of the intensity of its double sound. If to these we add increase in the extent to which dulness is perceptible on percussion in the precordial region, and occasionally a notable prominence in the same part, he thinks we have enumerated its proper signs. The whole mass of the heart, instead of the mere point, seems to come into contact with the side of the chest at each beat. This summary of symptomatology requires examination.

The energy of action of a hypertrophous heart, even when not subjected to the excitement either of exercise or of emotion, is such as to make it border on *palpitation*, and the patient has the annoying consciousness of his heart beating at almost all times. He is annoyed at its thus beating, and it palpitates the more because he is annoyed. The distress is increased by stimulants of any description, and sometimes by a full meal, however simple the kind of food. In noting now the impulse of the heart in hypertrophy we must be understood to refer to this morbid condition without valvular or vascular disease. It is better ascertained by the ear applied to the stethoscope than by the hand applied to the chest. A strong, slowly heaving impulse is the principal sign of simple hypertrophy; and the affection may be known to be greater when the impulse is followed by a *diastolic* impulse, as Dr. Hope calls it; by the first, the head of the observer applied to the stethoscope over the heart is distinctly raised, and he sometimes feels a shock disagreeable to the ear; by the latter there is a sinking back in a sudden manner of the heart, terminating in a jog or shock. In simple hypertrophy, and in that with contraction, the impulse is seldom perceptible much beyond the precordial region, except during attacks of palpitation. The impulse in this, as indeed in every other form of disease, is the more perceptible the thinner are the walls of the chest. Thus, it is the most distinct in the emaciated, and in children; whereas, in very stout and muscular subjects, it may be barely susceptible.

In *hypertrophy with dilatation* the signs are a compound of those of hypertrophy and those of dilatation. The contraction of the ventricles can easily be felt by the hand applied to the precordial region, and we find during palpitation smart violent shocks which sometimes repel the hand. In extreme cases, Dr. Hope has known the extent almost equal to that of the expanded hand. If we attentively examine the patient when most calm, we see that

not only his whole chest and the pit of his stomach, but his head, his bowels, and even the bed-clothes are strongly shaken at each contraction of the heart. The pulsations of the carotids, the radials, and the other superficial arteries, are often visible. The impulse of the heart can sometimes be distinctly felt as high as the clavicle in the left side of the thorax, and sometimes even on the left side of the back, especially in meagre subjects and children. The beats of the heart in hypertrophy, and hypertrophy with dilatation, free from valvular disease, are, even during palpitation, seldom irregular in the early stages of the disease, while the patient's general strength continues little impaired. But in the latter stage, preceding dissolution, the pulse intermits, and the dyspnœa is sometimes excessive. As the impulse of the heart is diminished by loss of blood, diarrhœa, or any exhausting disease, rigid and long-continued abstinence, and in general all the causes capable of producing debility, we must be aware of the temporary diminution or cessation even of impulse, in an actually hypertrophied heart during the operation of these causes. The impulse of the heart is moreover masked by the existence of pulmonary emphysema over the precordial region, and it occasionally ceases entirely, or becomes a mere oppressed struggle, when some affection of the lungs supervenes.

The *sounds* of the heart in hypertrophy are less than in health, or deadened. In *simple* hypertrophy the first sound, or that produced by the ventricular contraction, is duller and more prolonged than natural, in proportion as the hypertrophy is more considerable. The second sound, viz., that produced by the sigmoid valves during the ventricular diastole, is very feeble. The interval is shorter, owing to the first sound being longer. Both sounds are proportionately weaker in *hypertrophy* with *contraction*. Each sound of the heart, though essentially one, consists of the sounds of the two sides united; and hence it is only in hypertrophy of both ventricles that we must expect to find the sounds confined within very narrow limits. In hypertrophy with dilatation the sounds are increased to their maximum, being louder than in any other disease of the heart, especially during palpitation. It is therefore to this variety that the remark of Bouillaud respecting augmented intensity of sound applies. In *hypertrophy* with a predominance of dilatation, the first sound is not so loud as in the preceding variety, nor has it a prolonged termination, but is short and smart like the second.

Resonance of the precordial region on percussion is deficient in simple hypertrophy, if the heart be considerably enlarged; but as hypertrophy with dilatation is the disease in which the organ attains the greatest volume, it is that in which resonance is most frequently and most extensively deficient. The line of dulness where the heart comes in contact with the walls, may be traced with great precision; and it often forms a circle of two, three, and occasionally four inches in diameter. Prominence of the precordial region has been already noticed as one of the signs of hypertrophy.

Closely connected with the state of contraction of the left ventricle, whether in health or in disease, is the beat of the *pulse* at the

wrist. The pulse in hypertrophy of the left ventricle undergoes, from valvular and other lesions, a variety of modifications which disguise its real nature. It must, therefore, be studied in cases totally exempt from complication. In such, it is almost invariably regular, and bears strict relations in strength and size to the thickness and capacity of the left ventricle. Thus, in simple hypertrophy, it is stronger, fuller, and more tense than natural; it swells gradually and powerfully, expands largely, dwells longer under the finger, and in anæmic subjects, (but no others,) continues Dr. Hope, it is sometimes accompanied with a thrill or vibration. These characters are still more marked in hypertrophy with dilatation, so long as the hypertrophy is predominant; but when the dilatation has proceeded so far as to diminish the contractile power of the muscular fibres, the pulse, though still full and sustained, is soft and compressible. In hypertrophy with contraction of the cavity, it is tense, but small, expanding little under the finger; and if the contraction be great, it loses its tension and becomes weak as well as small, from the insufficient quantity of blood propelled into the arteries. I use here Dr. Hope's own language, as abbreviation would only obscure. He adds: The strength, largeness, and tense prolongation of the pulse of hypertrophy with dilatation, are often so remarkable, that, from this sign alone the practitioner may often make a successful conjecture at the nature of the disease; the inflammation only can impart similar strength, and comatose affections similar prolongation. Depression or exhaustion of the nervous system will of course modify the pulse of hypertrophy, and of hypertrophy with dilatation.

Arterial Pulse.— In order to render the arterial pulse a guide in the diagnosis of cardiac disease, we ought to have been well apprised of its signification in health. The beat of the artery at the wrist, that which for convenience sake we generally select, is the expression of the functional activity of the left ventricle, to whose contractions it regularly responds. When the ventricle contracts forcibly, the pulse is strong and resisting; when the ventricle contracts feebly, the pulse is weak and smaller. An oversight of the real physiological relations of the pulse has induced many, shall we say most practitioners, until of late years when organology is in the ascendant, to attribute to it various significations, and a mysterious import of the condition of the general system quite unwarranted by the real state of things. The pulse, then, whether in health or in disease, with the modifications to be immediately mentioned, is an index of the dynamic state of the ventricles, except when the valves interposed between the ventricle and the aorta or great artery are structurally affected. The changes in the pulse, in the different states of the system during the diurnal cycle, in health as well as in disease, indicate similar changes in the ventricle. The circumstances which modify this latter are of course various; the quantity and quality of the blood, the state of the respiratory organs, and modifications in innervation being the principal ones. There is yet another modifying cause of difference in the pulse, and

of course in the contraction of the ventricle as regards frequency, which depends on posture of the body. The number of pulsations when the body is in an erect position, will be from ten to fifteen more than when it is recumbent. So, also, between lying and sitting, and between this and standing, there are notable differences in the frequency of the pulse. The immediate cause is the muscular exertion and strain, by which the ventricle is tasked to greater effort to distribute the blood through the body. The hydrostatic pressure is inconsiderable, for if the muscular effort required for standing be removed by giving the body a fitting support, as by means of a revolving board to which it is strapped, so that the weight is transferred from the ground to the new support against which the body rests, the pulse is very little more accelerated than when the person is in a recumbent posture. The difference in the pulse in the different postures is called the *differential pulse*. It was noticed by Dr. Bryan Robinson, but more fully considered and explained by Drs. Graves, Knox, and Guy. It is most noticeable in the early part of the day, reaches its maximum about noon, and its minimum towards midnight. Contrary to what is generally believed on this subject, the excitability and frequency of the pulse in health are greater in the morning than in the evening. In the common forms of indisposition, attended with febrile nervous disturbances, the differential pulse is greater than in health; but in advanced stages of hypertrophy and dilatation of the heart, Dr. Graves has found very little change in this particular, or, in other words, that the pulse is very generally unaffected by posture. He suggests that this fixed character of pulse may be a useful sign in our diagnosis of hypertrophy of the heart or of organic disease, by which we can distinguish it from functional disease of this organ.

The quality of the pulse as regards volition and resistance will be not a little modified by the artery itself. Thus, when it has a thin yielding coat and large diameter, its beat will be relatively full and soft; when small, the pulse will be small and weak. At other times, again, as in old age, the coats of the artery become morbidly resisting and indurated, sometimes osseous, and then of course the pulse will feel hard if not strong. External causes, and particularly heat and cold, produce an effect on the pulse by modifying the state of the arteries. Moderate heat or warmth tends to expand the artery, and in this way to diminish the resistance which it makes to the blood impelled into it by ventricular contraction. Cold, on the other hand, as we learn from daily observation, even without reference to the direct experiments of Schwann, Müller, Hastings, and Williams, causes a contraction of the arteries, and consequently renders the pulse smaller. Dr. Williams, in experiments carried on in 1835 to ascertain the causes of the sounds of the heart, repeatedly observed that when the aorta of an ass, recently killed, was plunged into cold water, it contracted, so as not to permit the introduction even of the little finger, and its coats acquired an increased thickness and rigidity; the pulmonary artery did not contract so much.

In stating, as I did a few minutes ago, that the pulse at the most represents the physiological condition of the left ventricle, and represents also its dynamic condition, we are not to infer that in all the morbid states of the cavity it is equally and distinctly responsive. In the main there is, however, greater accordance between the two than might at first appear; as when the pulse is feeble owing to the transmitted ventricular impulses hardly reaching the radial artery, and yet when we listen to the heart we hear pulsations of some loudness, seemingly indicative even of violent efforts. But we soon learn that with all this seeming violence there is really a deficiency of power in the heart to propel the blood through the system. Commonly in these cases there is feebleness in the muscular parietes of the ventricle; but sometimes, and herein much tact in discriminating the difference is required, the ventricle is oppressed by the excessive quantity of blood sent to it, and relief is in the latter case procured by diminishing the quantity of the blood, and the pulse rises in consequence. But whatever may be the cause of these apparent contrasts between the force of the ventricle and the arterial pulse, you must take the proper steps to determine the actual condition of each; and to do this with effect you will follow the advice of Dr. Williams; and with your ear at the heart, and your finger at the same time on the radial pulse, make a careful survey of the circulation.

The proportion of the number of beats of the artery to a respiration in health, four and a half of the former to one of the latter, is a standard, mutable indeed, but still of value to aid us in our diagnosis of both pulmonary and cardiac as well as febrile diseases. Increase of respirations disproportionately to acceleration of pulse will indicate some disorder of the air-passages or lungs. In some forms of fever, again, as in typhus, the disproportion is on the side of the pulse, the beats of which are so frequent, while respiration is both relatively and even actually slower.

I proceed now after this, I hope not unreasonable, digression on the pulse, to finish an enumeration of the symptoms of hypertrophy. The complexion is generally of a higher colour; in many it is florid when hypertrophy is present in its first period. But after a while this sanguine hue of apparently full health is exchanged for "a purplish patch" on the cheeks, and a purple or violet colour of the nose and lips, the intermediate skin becoming pale and sallow. In those again who are naturally devoid of colour, when the hypertrophy is a little advanced, and the capillaries become obstructed, an universal cadaverous paleness and sallowness, extending sometimes even to the lips, overspread their face.

The *signs of hypertrophy of the right ventricle*, in addition to the physical or increased impulse and dulness on percussion under the lower portion of the sternum, are, 1, absence of the strong, large, and prolonged pulse of hypertrophy of the left ventricle; and 2, turgescence of the external jugular veins, accompanied by pulsation synchronous with that of the arteries. This last is regarded

by Dr. Hope as one of the best general signs, though after all an equivocal one, of hypertrophy of the right ventricle.

It is common to speak of the left ventricle as by far more liable to hypertrophy than the right; but the observations of M. Louis lead to a different opinion. Of 49 cases of valvular hypertrophy 29 were of the right ventricle.

Of *hypertrophy of the auricles* there are no general signs distinguishable from those of disease or obstruction in the corresponding ventricle or orifice to which the hypertrophy of the auricles owes its origin.

The *treatment* of hypertrophy on rational principles should be hygienic and medical. The first consists in an avoidance of all excitement, physical or mental, restriction to a simple diet, chiefly of vegetables and milk, the last in moderate quantities, and a very limited allowance of animal food in anæmic habits; abstinence from all alcoholic drinks, and from tea and coffee; an active state of the cutaneous function, maintained by frictions, the warm bath, and warm clothing; and, when it can be accomplished, the habitual inhalation of cool air. The quantity of food used, and even of the simplest drinks, must be studied as well as quality; for whatever distends the stomach in the first instance irritates the heart, and distends the bloodvessels subsequently. A full meal causes a mechanical pressure on the diaphragm, which is felt by the heart, and by irritation of the stomach affects sympathetically the heart in the same manner.

The medical treatment of hypertrophy ought, according to Laennec, to be begun by the abstraction of blood to as great an extent as can be borne by the patient without sinking; and the operation is to be repeated every two, four, or eight days, until the palpitation has ceased, and the heart no longer gives under the stethoscope more than a moderate impulse. Even when anasarca, ascites, œdema of the lungs, and a very marked state of cachexy have supervened, we ought not, in the opinion of this writer, shrink from bleeding and abstinence. Dr. Hope, with apparently a larger scope of observation of all the phenomena of the disease, and the secondary as well as the primary effects of large bloodlettings, thinks that it will be a safe practice to abstract small quantities of blood at longer intervals than those recommended by the French physician. He points to the anæmia which is apt to be induced by large and repeated sanguineous evacuations, and its accompanying palpitation and breathlessness on exertion or excitement, and that disposition to serous infiltration which in popular language is called "dropsy from debility." Hence, Dr. Hope argues, that it appears that the indications in the treatment of hypertrophy are, to diminish the quantity without materially deteriorating the quality of the blood; and to do this in such a manner as, without producing either reaction or anæmia, permanently to enfeeble the action of the heart and the energy of the circulation. Four, six, or eight ounces of blood should be taken every two, three, four, or six weeks, according to the age and strength of the patient, so as merely to keep down

palpitation, dyspnœa, and strong impulse of the heart. If the head be much affected, and symptoms indicate threatening apoplexy or inflammation of the brain, the practitioner must not limit himself to a few ounces of blood, but must bleed according to the principles which regulate the treatment of these affections.

This last advice seems to me to convey a correct idea of the course that ought to be pursued in the treatment of hypertrophy. There are, it is true, cases of young and robust persons, in whom nutritive life is very active, and who have strained, as it were, their heart by some immoderate exertion, who will bear and require the heroic treatment recommended by Laennec, and still more by Bouillaud, after the plan first laid down by Valsalva and Albertini. More especially is it to be carried out when pericardic adhesion and inflammation complicate, it may be were preceded by hypertrophy. In others, again, and probably the majority, including the poor and badly-fed labourer and artisan, or the dissipated inhabitant of a crowded city, the restrictions in the use of the lancet recommended by Dr. Hope should govern us.

Auxiliary to bloodletting is active purging, which may either follow this latter, or replace it, in the treatment. Common salines, such as Epsom salts, in doses of one or two drachms twice or thrice a day will answer the intentions proposed. Diuretics are also in severe cases very useful, and indeed decidedly advantageous; sometimes warding off a fatal result for many years.

Dropsy, so common an effect of heart disease, cannot be successfully treated without a knowledge of its organic origin. In fact, the pathology of dropsy resolves itself into that of the organ, — heart, kidney, or liver, or membrane, — pleura, pericardium, peritoneum, or arachnoid, on the lesion of which the serous infiltration depends. This is the whole key to the pathology of dropsy. In the present instance, after venesection and purging as far as may be deemed advisable, we have recourse to the most efficient diuretics, viz., the saline, the sedative, and mercury. Under the first we include the bitartrate and nitrate of potassa, and iodide of potassium; under the second digitalis, the opium of the heart, as M. Bouillaud calls it, colchicum, and squill, for the primary acrid operation of this last is soon followed by a sedative one. In some cases tincture of cantharides is given with benefit. I have frequently derived very satisfactory results from the tincture of digitalis in simple hypertrophy, anterior to any serous infiltration; and I cannot but believe that, if used after venesection and in conjunction with spirit of nitric ether, or some of the salines, it will contribute not a little to a cure of the disease, and at any rate the prevention of dropsical symptoms. The conditions for the advantageous use of mercury are nearly the same as those for free bloodletting. This article, useful in hypertrophy, with evidences of general nutritive excitement, and occurring in the sanguine and robust, is contraindicated in the cases of anæmia and cachexy with a predominance of nervous symptoms. Morbid irritability of the heart is aggravated by mercury, as it would be by any other sedative and reducing agent. Other more commonly recognised

sedatives from the vegetable kingdom are well thought of by Dr. Hope, who, in all cases where there is considerable disposition to palpitation, resorts to them habitually: such as extract of hyosciamus or conium, in doses of three, four, or more grains twice a day. Camphor and assafœtida are, on occasions, good remedies. Tartar emetic as a counterstimulant, either alone, or what is generally preferable, in combination with opium, will be worthy of trial at this time. Like mercury it is opposed to nutrition, and will on this account be adapted to a state of the organ in which this process is preternaturally active.

When palpitation is caused by morbid sensibility of the nervous system, which, again, is often kept up by or associated with anæmia, as indicated by a pallid complexion, quick jerking pulse, debility, &c., remedies of a different nature must be had recourse to. Among these, preparations of iron rank foremost, alternating or combined with aloes or rhubarb, to regulate the bowels. A due proportion of animal food will be allowed to the patient under these circumstances.

Perseverance in the treatment is all important to success: it must be pursued for one, two, or three years, according to circumstances. Dr. Hope, founding his opinion on a large number of cases in private practice, which he has carefully watched, believes that nearly the whole who are under the age of forty may be radically cured of hypertrophy, provided it be exempt from complication with valvular or aortic disease, adhesion of the pericardium, softening of the heart, or other organic obstacles to the circulation; and provided also that the constitution is sound and the general health tolerably good. In persons under twenty-five years of age, even when dropsy has supervened, our prognosis need not be of a desponding nature; for they may be often cured.

LECTURE LXXX.

DR. BELL.

DILATATION OF THE HEART.—Its signs and diagnosis—Treatment, by moderate tonics.—*Diseases of the valves and orifices of the heart*—Their connection with hypertrophy—Large proportion on the left side—Proportionate size of healthy valves—Induration, excrescence, and vegetations of the valves—Endocarditis the most frequent cause of valvular disease—General symptoms and effects of an alarming nature—Peculiar and distinctive symptoms—Well-defined peculiarities of pulse—Prognosis—Physical signs—Murmurs—Their varieties—Venous or continuous murmur—Venous pulse—Its cause—Purring tremor or thrill.—*Pericarditis*—Its association with valvular disease and endocarditis—Symptoms—Physical signs—Rheumatic character of pericarditis—Sounds in pericarditis—Anatomical traits of pericarditis—Prognosis.—*Endocarditis*—Its origin in rheumatism; a frequent concomitant with pericarditis—Its anatomical characters—Termination in valvular disease—*Treatment of pericarditis and endocarditis*—Free depletion by venesection, purging, and diuretics; counterstimulants; mercury; hydriodate of potash—Chronic endocarditis; treatment of.

DILATATION OF THE HEART, consisting in an amplification of one or more of its cavities, is associated often with hypertrophy, in which

the cavity is enlarged and the walls thickened. It may be simple dilatation with the natural thickness of the walls preserved; or it may be accompanied by unnatural thinness of the parietes of the heart. This last, or *dilatation and attenuation*, although it is the one most insisted on by some writers, is impliedly denied to exist by M. Louis, since he says he has not seen a case of the kind. Dr. Hope, however, at once, on opening the subject, refers to a case (p. 289) in which the prevailing thickness was only two lines, and the apex was a mere membrane, or rather consisted of the internal and external membrane strengthened by a deposition of lymph on the outside. Dilatation takes place more in the transverse than in the longitudinal direction of the ventricles, and hence it communicates to the heart an unusually spherical form; so that, from this configuration alone, we may often at once determine whether a heart is dilated or not. When both the auricle and ventricle are much dilated, it is not unusual to find the intermediate aperture widened, and its valve sometimes not large enough to close it. As this causes regurgitation, it is as serious a malady as disease of the valve itself, by producing the same effects.

In reference to the causes of dilatation the disease itself may be regarded as purely a mechanical effect of over-distention. Contraction of an orifice, nervous palpitations, occupations requiring constantly renewed and long sustained muscular efforts, are so many causes, which we may express in a general way by referring to them deficient action of the heart and all obstructions to the circulation whether situated in the orifices of the heart or in the aortic or pulmonary circulation. Dilatation affects only a single ventricle, and it is generally the right, but seldom in a great degree. More commonly it attacks both, and then the extent may be greater in either. It is seldom that dilatation of the auricles occurs under any other circumstances then those of disease of their valves. By some it is alleged that the right auricle and the left ventricle are the most common seats of simple dilatation. Its anatomical characters are not only a thinning and extension of the walls of the affected compartment, but also generally a paler and more flaccid condition of their muscular fibres.

The *signs and diagnosis of dilatation* are, palpitations of a feeble oppressed kind, pulse soft and feeble, chilliness of the extremities, melancholy and indifference to exertion, accumulation of blood in the lungs causing difficult respiration, cough, expectoration of a thin serous mucus, œdema of the lungs greatly aggravating the dyspnœa, terrific dreams with starting from sleep, passive pulmonary hemorrhage, which last is often the precursor of death in individuals who have suffered much from laborious respiration. Pulmonary venous engorgement gives rise to serous infiltration, which generally appears first in the lower extremities, discoloration of the face, congestion of the brain, and of the mucous membranes, passive hemorrhages, congestion and enlargement of the liver. This last is a very common consequence of retardation

of the blood on the right side of the heart; and it gives rise in its turn to ascites and jaundice, favours eminently hematemesis, intestinal hemorrhage, piles, and, though indirectly, uterine hemorrhage. Angina of the heart may occur as an adventitious complication of dilatation no less than of hypertrophy. Of all the general signs of dilatation of the *right ventricle*, Dr. Hope agrees with Laennec in regarding a permanent turgescence of the external jugular veins without sensible pulsation as the most constant and characteristic.

The *physical signs of dilatation with attenuation* are, diminished impulse, which in some cases is entirely absent even during palpitation, an approximation of the first to the second sound of the heart, analogous to the flapping of a pair of bellows, or a gentle tap on the hand with a finger. When, says Dr. Hope, whose opinion I so generally give in his own language, there is dilatation with attenuation, even in a moderate degree, the first sound becomes almost the same, and nearly as strong as the second; and, finally, when the dilatation is considerable, the two sounds cannot be distinguished either by their nature or intensity, but solely by their respective situations, (the first over the lower half of the ventricles, and the second over the semilunar valves, opposite to the lower edge of the third rib, and thence up the great arteries,) and by their respective relations of synchronism or anachronism with the arterial pulse. In proportion as the sounds of the heart are louder, they are audible, *cæteris paribus*, at a greater distance over the chest. The *resonance on percussion* of the precordial region is diminished by dilatation. When it extends over the inferior part of the sternum it denotes dilatation of the right ventricle.

In the *progress* of dilatation we often see it in a moderate degree merely give rise to a simply shorter respiration than common, and the patient experiences palpitations from very slight causes. When dropsy comes on, and, after having been removed by remedies, constantly shows a disposition to return, we may know that the dilatation tends to its fatal termination.

The *treatment* of dilatation with hypertrophy or increased power of the heart has been already detailed. That of dilatation with thinness and diminished power will be begun by a removal of the more obvious causes, such as hydrothorax, chronic bronchitis, asthma, or the use of wind-instruments, too violent exertion, drunkenness, and a constrained posture. Our hopes of cure will rest mainly on the absence of contraction of any orifice of the heart, or the comparative recency of the disease. The medicinal course will be of the moderately tonic kind, and particularly of iron in full doses. But if there be inflammation of the lungs or bronchi, this should be removed by appropriate means. It is very important that the patient should be protected against atmospheric vicissitudes, and particularly cold and moisture. Attacks of dyspnœa are best relieved by the warm pediluvium, at the same time that, while a blanket is thrown round the patient to promote perspiration, fresh and cold air be admitted for him to breathe: he should take, also,

some antispasmodics, as of assafœtida combined with camphor, or laudanum and ammonia. Venesection is generally inadmissible, for the most part injurious, and sometimes fatal.

Diseases of the valves and orifices of the heart are intimately connected, sometimes as cause and sometimes effect, and often associated, without our having a precise knowledge of the order of causation, with hypertrophy, dilatation, aneurism, and softening of the heart itself. Frequently they follow endocarditis. Valvular disease is much less frequent on the right than on the left side of the heart. Out of 400 cases of valvular disease, Dr. Hope has not met with at the utmost twenty cases of disease of the right valves, which would only be 5 *per cent.*, or 1 in 20. Dr. Clendinning has met with 1 in 16. The induration on the right side was almost always fibrous or cartilaginous, and not osseous. Before speaking of morbid states of the valves and orifices, one of the most common, which in the latter is contraction of its size, we ought to know the average healthy standard. Mr. Bizot, quoted by Dr. Pennock in his additions to Dr. Hope's book, lays down, as the result of examination of 171 hearts, the following proportions: — The circumference of the left aurico-ventricular valves is from 25 lines in early life, that is, one to four years, to 48 lines and a fraction; in advanced life, between 50 and 79, the measurements of the right valve are $29\frac{3}{5}$ lines to $57\frac{1}{2}$ for males, and 27 lines to 49 and a fraction for females, in the same two extremes of life. The circumference of the aortic orifice is from 17 to 36 lines in the male heart, and $16\frac{1}{10}$ to $32\frac{1}{8}$ lines for the female, at the same limits of early and advanced age; that of the pulmonary orifice is $18\frac{3}{5}$ to 35 lines for the male, and 17 to $32\frac{17}{30}$ for the female, of the ages already specified.

Indurations of the valves with contractions of their aperture are caused by ossification and thickening, sometimes excrescences or vegetations. Calcareous matter is sometimes deposited on the valves and causes their induration. The change in structure is usually the result of inflammation either of the serous membranes of the valves or of their proper substance. Ossification of the valves is common in old people after sixty. Another affection of the valves, whether auricular or semilunar, occasioning regurgitation, is atrophy. Even without any disease of the valve itself, regurgitation may take place when, in consequence of dilatation of the auricular orifice, the valve is not large enough to close.

The exciting causes of valvular disease of the greatest moment and of the most frequent occurrence is inflammation of the intestinal membrane of the heart, or *endocarditis* generally connected with acute rheumatism. Other causes are overstraining the valves by increasing the force of the circulation. Dr. Williams divides diseases of the orifices and their valves into the *obstructive*, or those that more or less *obstruct* the current of blood in its proper channel, and the *regurgitant*, or those which occasion it to take a *reversed* direction.

When we inquire into the *general symptoms and effects* of valvular disease, we soon find that they are seldom dependent on obstruction of the valves alone; but are partly attributable to coexistent disease of the muscular tissue of the heart. So long, in the opinion of Dr. Hope, as the organ remains free from dilatation, hypertrophy, or softening, the valvular disease is not in general productive of great inconvenience. He has seen individuals who were affected in an eminent degree with disease of the valves or of the aorta maintain for years a very tolerable degree of health, so long as there was no hypertrophy or dilatation of the heart: but in proportion as these supervened, the symptoms of valvular obstruction became more and more developed, and eventually assumed their most aggravated form.

The general symptoms are the same whether the disease be fibrous, cartilaginous, osseous, or consist of vegetations. The symptoms are cough; copious watery expectoration in many cases; dyspnœa; orthopnœa; frightful dreams, and starting from sleep; œdema of the lungs; pulmonary congestion and apoplexy; passive hemoptysis, that is, sputa stained with dark and grumous blood, which occurs especially in great contraction of or regurgitation through the mitral valves; turgescence of the jugular veins; lividity of the face; anasarca and dropsies in general, which in this form of disease attain their utmost degree; injection of any or all the mucous membranes; passive hemorrhages from those membranes; engorgement of the liver, spleen, &c., and congestion of the brain with symptoms of oppression sometimes amounting to apoplexy, occasionally cerebral hemorrhage.

The peculiar and distinctive signs of valvular disease are — 1, great severity of those of hypertrophy or of dilatation alone, the paroxysms of palpitation and dyspnœa in particular being more violent, more obstinate, and more easily excited; 2, well defined peculiarities of pulse, first clearly ascertained by Dr. Hope after having made written notes of 10,000 cases. When the *mitral valve* is contracted, and also when it admits of free regurgitation, the pulse is, in various degrees, small, weak, irregular, intermittent, and unequal. When either the contraction or the regurgitation is great, the whole of these characters are invariably present. But when the degree of either is slight, the effect on the pulse may only be a slight degree of weakness and intermittence, increasing when the circulation is hurried. But then it must be admitted, that softening of the heart, pericarditis with copious effusions, endocarditis causing polypi in the cavities, and polypus in any other disease of the heart, will give the same kind of pulse. The pulse in contraction of the aortic valves, contrary to the assertion of Corvisart, Louis, Bouillaud, is not, as we learn from Dr. Hope, small or permanently irregular, unless the case be one of extreme contraction. The pulse *of regurgitation* through the aortic valves is permanently *jerking;* a high degree of the pulse of unfilled arteries, as seen in anæmia from any cause. Valvular diseases of the right

side of the heart produce little effect on the pulse; for these reasons, as assigned by Dr. Hope, 1, because there is not a direct connection between that side and the arterial system; and 2, because the action of the organ is less under the influence of the right ventricle than of the left, in consequence of the superior muscular strength of the latter. *Pain* in the region of the heart is another symptom that affords presumption of disease of the valves. Where the valves, the coronary arteries, or the beginning of the aorta are infiltrated and inelastic, not stretching equally with other portions of the heart, that pain occurs most frequently and with the greatest severity. Pain of this description has acquired the name of *angina pectoris.*

The *prognosis* in valvular disease must be guarded, since the termination may be either sudden, or preceded by the customary signs of approaching dissolution, or by symptoms of pressure on the brain, or cerebral hemorrhage.

The *physical signs* of diseases of the valves, are merely a tremor communicated to the hand applied over the heart, and certain sounds or murmurs caused by the heart's action. A few words on valvular murmurs will precede my remarks on diagnosis of valvular disease; or, more correctly speaking, they will form a necessary introduction to this latter. In disease of the valves the sounds become various morbid murmurs, as those of bellows, sawing, filing, rasping, whistling, or a perfectly musical tone. The several murmurs indicative of valvular diseases are, according to Dr. Hope, 1, the *systolic murmurs* which attend the ventricular systole in every degree of fibrous, fibro-cartilaginous, steatomous and osseous disease of the aortic valves sufficient to contract the apertures. The same remark applies to vegetation in the valves or in the orifice. This sound, according to Dr. Williams, seems broken into by something like a flap in the middle. It is well to be aware, also, as stated by Dr. Pennock, that a very rough bellows murmur, a whizzing or rasping sound. is heard over and above the aortic orifice; when a ridge of cartilaginous or ossific deposit is found around the internal circumference of the ascending aorta, near its valves, though these valves may be in a normal condition. If the lesion be near the cardiac origin of the artery, the second sound is frequently obliterated. *Diastolic murmur* of the aortic valves, or from regurgitation, is occasioned by all the varieties of fibrous, fibro-cartilaginous, steatomous, and osseous transformations, and also by inflammatory tumefaction in acute and chronic endocarditis. The murmur is soft like bellows murmur and generally prolonged, "a long sigh tailing as it were the second sound." Systolic murmurs of the pulmonic valves are rarely if ever met with; and the same may be said of the diastolic murmurs of these valves. The probabilities are at least thirty to one against a murmur connected with the semilunar valves being seated in the pulmonic set. Systolic murmur, that is, from regurgitation, is loud considering the depth of its seat, because it is occasioned by the

great force of the ventricular contraction. This is of all murmurs the most frequent, in Dr. Hope's experience.

When speaking of venous murmurs as the consequence and a sign of interrupted circulation in the veins, it may not be amiss to make some reference to the *venous pulse*. This phenomenon has been noticed at different times by practitioners, who are not, however, at all agreed as to its cause. It has been most frequently observed in the upper extremities, and most commonly in females; but whether dependent on a peculiar state of the veins themselves or of the heart, we do not know. In nearly all the cases recorded, there was some obstruction either to a free and regular circulation, by hypertrophy or valvular disease of the heart, or some congestion or inflammation of the lungs. A modification of venous pulse, the throbbings of the jugular, we are able often to trace to disease of the right side of the heart, such as regurgitation from the right ventricle.

The following conclusions may, Dr. Hope thinks, be deduced respecting valvular murmurs: —

1. The ventricular *systolic* currents through contracted orifices, from being stronger than the *diastolic*, produce louder murmurs.

2. Considerable contractions, of a rough, salient configuration, whether osseous or not, produce the rough murmurs of sawing, filing, or rasping, provided the current be that of the ventricular systole, its diastolic currents being too feeble.

3. The pitch or key of murmurs is higher in proportion as they are generated nearer the surface, and the currents producing them are stronger; and *vice versâ*. Also, the key is lowered by distance, independent of depth, from reverberation through the chest.

4. Musical murmurs indicate nothing more than ordinary murmurs.

5. Rough murmurs, and even loud and *permanent* bellows murmurs, indicate organic disease.

6. Permanent murmurs from regurgitation necessarily indicate organic lesions.

7. Continuous murmurs in the heart will probably be found to indicate, sometimes organic disease attended with regurgitation out of the aorta into the right ventricle or pulmonary artery; sometimes churning of a little serum between layers of rough lymph on the pericardium; and sometimes, probably, dilatation of the pulmonary artery and compression of the vena innominata.

The *venous or continuous murmur* was first explained by Dr. Ward of Birmingham, and since then has been more fully illustrated by Dr. Hope. It is in a much lower key than the arterial bellows murmur; for while the latter is often as high as the note produced by whispering the letter *r*, and seldom lower than *air*, the venous murmur is usually as low as *who*. This sound offers to Dr. Hope's mind the most complete and ready imitation of the phenomenon. Its loudness and intensity will depend on the greater or less depth of the vein, and the degree of pressure to which it is

subjected. *Musical venous murmurs.*—By the adroit management of pressure with the stethoscope over or near large veins, the venous murmur may often be raised, by a gradual swell, into a more or less musical hum, such as is yielded by a child's humming-top. This Dr. Hope proposes to call *venous hum;* a more appropriate title than that of *bruit de diable*, given to it by M. Bouillaud. The constitutional causes of the venous murmur, hum, and whistle, are exactly the same as those of the arterial bellows murmur, viz., impediment to the regular and even flow of blood in the canal, or deficient power to propel the fluid in the vessels. This last is very common in anæmia and in chlorosis.

The *purring tremor* or *thrill* of the heart (*bruit cataire*), is produced by contraction of the semilunar valves or of their respective orifices; but it is rarely felt because the sternum is interposed: if, however, adds Dr. Hope, the heart is displaced from beneath the sternum by hydrothorax, emphysema, (even circumscribed emphysema,) encephaloid or other tumours, &c., the tremor may then become perceptible in the region of the semilunar valves. Regurgitation of the mitral valve, is, in the opinion of the author just cited, beyond comparison the most frequent cause of tremor in the heart, since the current is strong, and the tremor admits of being felt through the costal interspaces.

The *treatment* of valvular diseases will be conducted on the same principles as endocarditis, from which they so often originate.

Pericarditis.—I have already mentioned the frequent association between diseases of the valves and endocarditis, or inflammation of the lining membrane of the heart; an extension of which to the valves is believed, by M. Bouillaud, to be the chief cause of their organic change,—thickening, vegetations, and ossifications. Pericarditis, or inflammation of the investing membrane of the heart and its duplicated extension, is perhaps of still more frequent occurrence; and merits notice first. Great interest is attached to both these membranous diseases, from their frequent connexion with articular rheumatism, to which they so readily succeed, without proper care, and even at times when all due skill has been manifested in the treatment of the prior affection. Pericarditis is not easily recognised by fixed general symptoms, although these are laid down as diagnostic in some systematic works.

Symptoms.—The existence of *pericarditis* is believed, by M. Bouillaud, to be certain in the individual affected with rheumatism when the following symptoms are present: a dull sound, on percussion, over the precordial region, on a surface double and triple the extent of that in health; arching or elevation of the same region; remote beatings of the heart, but which are little or not at all sensible to the touch; sounds of the heart distant and obscure, and accompanied by different abnormal sounds, some arising from the rubbing of the opposite coats of the pericardium against each other, others from the complication of pericarditis with valvular endocarditis; and a pain more or less acute at the region of the heart. Palpitations,

irregularities, inequalities, and intermissions of pulse, are sometimes conjoined with the above symptoms.

Dr. Williams believes that pericarditis cannot exist for any length of time, and certainly not to a dangerous extent, without producing *physical signs* that are quite characteristic. The cases in which we should especially be on the look out for the signs of pericarditis are those of rheumatism in all its forms, but particularly the acute kind, which is generally called rheumatic fever, the subjects of mechanical injuries, or of pleurisy or pneumonia affecting the left side; and all doubtful instances of difficult breathing, especially when accompanied by œdema, general or partial.

Pericarditis and endocarditis of a rheumatic character may occur primarily in one person from the same causes which in another would give rise to articular rheumatism, or they may be the consequence of metastasis; or, finally, the sequelæ of the articular variety, as well as of rheumatism in other parts.

M. Bouillaud, who has paid most attention to pericarditis and endocarditis, as connected with articular rheumatism, asserts that in eight cases out of nine the latter affection is accompanied by one or both of the former. In another estimate made by this writer the proportion is not so great; out of ninety-two cases recorded by him, there were thirty-one in which pericarditis and endocarditis coincided with articular rheumatism; viz., seventeen of pericarditis, and fourteen of endocarditis.

Dr. Williams corroborates the views of M. Bouillaud, in regard to rheumatism being by far the most common cause of pericarditis, adding, "but it still more frequently produces endocarditis;" and although he does not think these inflammations are essentially a part of rheumatism, he can confidently state that he has found signs of endocarditis or pericarditis, or both, to a greater or less extent, in fully three-fourths of the cases of the disease in question. He adds, that in a little more than half of the proportion just stated, there was no complaint of pain in the chest, palpitation, or dyspnœa. Dr. Macleod (*Med. Gaz.*, 1837–8) makes the proportion one-fifth. Dr. Hope states that acute rheumatism had preceded about three-fourths of the worst cases of valvular disease and adhesion of the pericardium, four hundred in number, which have occurred among upwards of ten thousand hospital patients.

The first physical sign of inflammation of the membranes of the heart, is an increased loudness of the natural sounds, with an impulse stronger and more abrupt than usual. The more distinctive signs of pericarditis are, various sounds of superficial friction, which are quite characteristic. At first this sound is soft and rustling like the rubbing together of two pieces of paper or silk stuff; and it may accompany only part of the natural sounds, from which, however, it is obviously distinct, in being much more superficial. It is generally heard first about the middle of the sternum, or to the left of it, corresponding with the base of the heart, or the attachment of the auricles. It afterwards increases in loudness and duration, being heard beyond the immediate region of the heart,

and accompanying not only the periods of the natural sounds, which it disguises, but also the interval between them. It thus gets a sort of continuous jogging rhythm, corresponding with the movements of the heart, which is like that of the saddle when one rides on horseback; and when, as it generally happens, the friction sound becomes harder, and more like the creaking of leather, its resemblance to the noise of a new saddle is quite ridiculous. In some cases the noise is crackling, like that of crumpling dried membrane or parchment. Inflammatory injection alone of the pericardium will not produce it; but the smallest effusion of lymph, and even slight ecchymosis, or effusions of blood under the pericardium proper, from acupuncture, may cause distinct rustling or rubbing sounds. The natural sounds of the heart are completely disguised by the friction sound; but they may sometimes be heard at the top of the sternum, and in the carotid arteries, and they will be often attended with a murmur; this depends on the simultaneous existence of endocarditis, and will be noticed presently. The pericarditic friction does not continue for many days in succession.

The anatomical traits of pericarditis are, preternatural redness of the membrane, coagulable lymph adhering to its surface, and fluid effused within its cavity. Rarely does the pericardium undergo thickening. Lymph after effusion sometimes becomes organised with astonishing rapidity, as within the space of twenty-four hours. Effused serum within the cavity of the pericardium is seen conjointly with lymph. Purulent effusion is more common in the chronic stages. In thirty-seven cases of pericarditis, Louis found that effusion was sero-sanguinolent in five, serous in nine, sero-purulent in fifteen, and true pus in seven.

Resolution is the most common termination of pericarditis, which, in a large majority of cases, is a curable disease. Adhesion of the pericardium is a less favourable termination. Valvular disease is a frequent termination of the endocarditis accompanying pericarditis. Chronic pericarditis is a sequela of the acute form, though sometimes it comes on with scarcely any precursory symptoms of acuteness.

The *prognosis* in pericarditis is generally favourable. Bouillaud declares that he saves the greater number of his patients. Dr. Hope, while criticising the treatment by large and repeated bloodlettings of the French author, goes farther, and tells us that one fatal case in twelve is about "the outside" of his loss. The average duration of the disease under treatment, ending favourably, is a week or ten days. It has terminated fatally in twenty-seven hours. If pericarditis be not arrested early in its progress, the prognosis is unfavourable, as we may then fear adhesion of the pericardium, and complications of hypertrophy, carditis, softening, and even valvular disease. The treatment of pericarditis will be described at the same time with that of endocarditis, after I shall have detailed the chief phenomena, vital and physical, of this latter.

Endocarditis has received the present designation from M. Bouil-

laud, who has been most zealous and successful in enlarging our knowledge of the disease and its complications, and especially frequent rheumatic character. His predecessors in this department of medical investigation, Baillie, Burns, Kreysig, and Laennec, had pointed out the occasional existence of inflammation of the lining membrane of the heart; and Dr. Watson had even recognised and publicly noticed the frequency of this affection, previously to M. Bouillaud's publication on the subject. Dr. Hope says that the fact of the frequency of endocarditis, as well "as almost every other of importance which M. Bouillaud has published, either on endocarditis or pericarditis, is to be found in the works of Dr. Latham, Dr. Elliotson, Dr. Stokes, and myself." Be this as it may, it is not the less certain that the attention of the profession generally was only fully awakened to the importance of the subject by the writings of M. Bouillaud, as contained in his works on the Heart, and on Acute Articular Rheumatism. Dr. Hope candidly admits this, when he says: "To M. Bouillaud the merit is due of having been the first to draw attention in a decided manner to inflammation of the internal membrane of the heart and great vessels."

Endocarditis is most commonly a sequence, or rather, we ought to say, a continuation of acute rheumatism. In such circumstances it is known, according to M. Bouillaud, by the following signs:— Bellows, file or saw sound in the precordial region, with a dulness of this part on percussion, to an extent much more considerable than that in the normal state, and also sometimes, but in a less degree than in pericarditis with effusion, an elevation or abnormal arching of the chest: the movements of the heart raise with some force the precordial region; and these are often irregular, unequal, intermittent, and accompanied, at times, with a vibration and trembling. The pulse is hard, strong, vibrating, unequal and intermittent, like the beatings of the heart.

On the subject of diagnosis of endocarditis, Dr. Hope says, I may now sum up by stating that this affection may be supposed to be present if a person be *suddenly* attacked with three signs: 1, fever; 2, violent action of the heart; 3, a valvular murmur which did not previously exist, provided the murmur be well distinguished from an attrition-murmur, as the latter indicates pericarditis. The evidence is still stronger if the signs occur in connection with acute rheumatism.

Endocarditis is a frequent concomitant of pericarditis, especially when it is of a rheumatic character; the anatomical reason for which is found in the fibrous structure intermediate between the two membranes, at the auriculo-ventricular and arterial orifices, and which itself is so obnoxious to rheumatic inflammation.

The anatomical characters of acute inflammation of the endocardium are, redness, an effusion of lymph or pus on its surface, and thickening, softening, and ulceration of its substance and of the subjacent cellular and fibrous tissues; also, according to M. Bouillaud, the presence of adherent, colourless coagula of blood. Remembering the peculiar exposure of the endocardium, that is, its

being continually bathed by blood, which on its passage through the heart must carry away any exudation or lymph formed by the membrane, we must not expect to find there traces of inflammation after death, as we find them on other serous surfaces. Still we do meet with, in subjects dead of rheumatic and other inflammations of the heart, on the membrane near its valves, and especially at their attachments and *corpora aurantii* at their margins, striated or punctuated patches of vascular redness, sometimes accompanied by an inequality, roughness, or softness of the membrane, occasionally with soft, thickening, or distinct films of soft lymph upon it. In some cases, continues Dr. Williams, we find apparent abrasions or distinct ulcerations of the membrane; and to the edges of these, or to any roughness or irregularity which the valves or lining membrane may present, are attached little soft, fibrinous bodies, generally of a rugged conical shape, and more or less tinged with blood, which have obtained the name of *vegetations*.

The chief cause of endocarditis is acute rheumatism; or rather it is during this latter disease and as a part of it that we meet with the heart affection. We may say, in general, that endocarditis is induced by the same kind of causes as pericarditis. It may occur either as a primitive or as a consecutive disease. The affections on which it is most apt to supervene are, pericarditis, pleurisy, phlebitis, and acute rheumatism. In the acute stage it may terminate fatally in a very few days; and one of the principal causes of death here is supposed to be the extensive formation of sanguineous concretions within the heart. If actively and properly treated it will generally end favourably within about a week; but if it pass into the chronic state, its duration is indefinite. Yet even here the lesions thus produced become sometimes apparently stationary, and under judicious management life may be prolonged to a very advanced period.* We ought not, however, to be unmindful of the following remarks of M. Bouillaud in his work on acute articular rheumatism already noticed. "If it be true that acute inflammatory affections of the heart are much less fatal than has been supposed, it is but too true, at the same time, that, persisting, they ordinarily leave in their train lesions called organic, under which the invalid finally sinks, when they affect those parts whose functions are necessary to life. This is what actually takes place when endocarditis has been followed by thickening, induration, adhesions, vegetation of the valves with deformity, obliterations of these valves, contractions of the orifices, dilatations of the cavities, hypertrophy of the muscular substance," &c.

Dr. Hope judiciously observes: — "The termination of endo-

* They who cannot consult the *Traité Clinique du Cœur, &c.*, par J. Bouillaud, Professeur de Clinique, &c., will find a very good digest of the work in an article taken from the British and Foreign Medical Review, and inserted in my *Eclectic Journal of Medicine*, for April and June, 1837.

carditis in valvular disease has, I fear, been by far the most common up to the present time, especially amongst the working classes. This is in consequence of endocarditis having been little known as an effect of acute rheumatism; whence the treatment of the latter was not specifically directed to the obviation or removal of the former. In proof of this, I may repeat a statement already made, that I have found the worst forms of valvular disease to date more frequently from "rheumatic fever, (by which is to be understood rheumatic endocarditis,) than from all other causes put together. The eyes of the profession are now attentively directed to this subject; and it is to be hoped that it will soon become one of the best known, because most important, in medical science — one, in short, of which it will be disgraceful to be ignorant."

The treatment of both pericarditis and endocarditis, in their acute forms, will consist at first in free and frequent bloodletting, both general and local. M. Bouillaud, in the case of an adult in the vigour of life seized with pericarditis, orders, on an average, from three to four venesections, each to the amount of twelve or sixteen ounces, within the three or four first days; together with the simultaneous application of twenty or thirty (French, of course) leeches, or cupping to the extent of eight or twelve ounces during the same period. In feebler subjects, or where the intensity of the disease is not so distinctly marked, local bloodletting, by means of cups over the left side of the chest, or of leeches under the mamma of that side, must suffice; to be followed by purging and counter-irritation by means of blisters, tartar-emetic, or croton oil to the chest. Tartar emetic internally, and colchicum, which I have found to be serviceable in acute articular rheumatism, should now be used if the disease has not been arrested by bleeding.

The treatment of acute endocarditis is essentially the same as that of pericarditis; or if there be a difference, it is only in the still earlier recourse to copious and repeated depletions, in order to prevent the coagulation of the blood, the deposition of false membranes within the heart, and permanent derangement of its mechanism. Even when it supervenes on rheumatism in other parts, for which active remedies had been freely used, we ought not to be deterred from recourse to the means already indicated for its cure. In a case of endo-pericarditis, which succeeded to acute and violent rheumatism of the bowels, and for which I had bled both generally and locally, I had recourse notwithstanding to the lancet and to cups over the chest. The result was a complete convalescence and restoration to perfect health — rendered the speedier by the exhibition of the sulphate of quinia after the depletions.

In thus bearing testimony in favour of free bloodletting in endocarditis and pericarditis, I ought to add, that the practice to the extent recommended and pursued by M. Bouillaud is only called for in those cases in which temperament, prior robustness of frame, and sanguineous plethora, with violent rheumatic seizure, conspire to give these diseases great intensity at an early date. Subjects of

a more mixed habit of body and constitution, and in whom the acute stage has passed into the sub-acute, or thence into the chronic, are better treated by moderate bloodlettings, to the avoidance of sudden or full impressions on the circulation; and in these cases free and repeated local bleeding should be regarded and employed as a measure of at least equal importance. Dr. Williams recommends that calomel and opium should be given until the gums show their effects; and he adds that this combination seems to be most valuable twice or thrice in the day, as prescribed by Dr. Chambers. One ought to be very sure of the diagnosis before causing ptyalism, which aggravates common palpitation and other disorders of the heart. As the disease becomes more chronic, Dr. Williams directs two or three grains daily of the hydriodate of potash, with a view to promote the absorption of the effused lymph. Of this remedy I should, from my own experience, augur favourably; and I may add, also, that it is valuable in rheumatism of the joints, particularly in *synovitis*, or where the synovial rather than the fibrous membrane has been the seat of inflammation. The hydriodate, but in doses of ten grains increased to thirty, three times a day, is used regularly by Dr. Graves towards the latter period of acute articular rheumatism.

Dr. Hope's advice, as the result of very large and long experience, merits our confidence. The *treatment*, he says, suitable for acute endocarditis, is the same as that for pericarditis, and *it must not be less prompt and vigorous*. The practitioner must not be misled by the apparent mildness of the symptoms in cases where there is little impediment to the circulation through the heart. He must never, for an instant, forget, that there is a *possibility* of subsequent valvular disease, and that the mere possibility is a contingency of such magnitude, as to merit all the resources of his abilities and experience for its obviation.

In chronic endocarditis, Dr. H. has experienced the most satisfactory results from prolonging the mild use of mercury, so as to maintain a barely sensible effect on the gums, for three, four, five, or six weeks; simultaneously employing a succession of small blisters on different parts of the precordial region, restricting the patient to a farinaceous and light broth diet, and confining him to bed, for the purpose of *insuring* the utmost possible corporeal tranquillity.

Should the murmur still persist, the mercury may be discontinued, and its future resumption must be left to the judgment of the practitioner; but the counter-irritant, antiphlogistic treatment, in a moderate degree, that is, short of reducing the patient to a state of anæmic debility, together with quiet and the use of digitalis and mild sedatives, as extr. hyosciami and tr. or infus. lupuli, may be advantageously continued for several months, with the view of completely subduing the chronic inflammatory process, and allowing any thickening that has already taken place to undergo the utmost possible absorption. Beyond this, the treatment resolves itself into that of established valvular disease.

LECTURE LXXXI.

DR. BELL.

DISEASES OF THE HEART (*concluded*).—*Hydropericardium*—Its varieties; their causes and treatment—*Adhesions of the pericardium.*—FUNCTIONAL DISEASES OF THE HEART—Vagueness of this title—Explanation—*Palpitations;* their different origins and different treatment, according to organic and constitutional complication.—*Syncope*—Causes—occasional danger from.—Treatment—Precautions in particular cases to avoid syncope.—*Neuralgia of the heart and angina pectoris*—Symptoms—Causes; not well known—Treatment, to vary with complications of disease in other organs.—Asthma.

HYDROPERICARDIUM is one of the consequences of unchecked pericarditis; but more frequently, according to M. Bouillaud, it is the result of an obstacle to absorption and to free venous circulation, in consequence of the primary disease of the heart. There being no sound of respiration, and sometimes a prominence of the ribs in these parts, the case might be taken for pleuritic effusion; but that the sounds of respiration and percussion are still good in the back and in the axilla, and are not materially varied by the change of posture. The sounds of the heart become distant and obscure, and its beat, if felt at all, is (as Corvisart has remarked) very variable as to the place where it is perceptible; being sometimes on the left, and occasionally disappearing altogether, when the patient is lying in a supine posture. The *treatment* of hydropericardium will be the same as that of other dropsies; if it be of the active kind, or the result of pericarditis, bloodletting, general or local, according to the activity of the circulation, will be called for; but if the dropsy be passive, bloodletting will be dispensed with, and counter-irritants had recourse to; such as blisters, either in succession, or kept open with savine cerate, tartrate of antimony and pitch plaster, likewise setons and issues. Purgatives and diuretics will come into service in both varieties of the disease; but in the passive, they will be followed by or alternated with tonics — quinia or the muriated tincture of iron.

Adhesions of the pericardium are generally associated with hypertrophy with dilatation. Cases of adhesion terminating in enlargement, in Dr. Hope's experience, often hurry to their fatal conclusion with more rapidity than almost any other organic affection of the heart. He differs from Bouillaud, who does not think that adhesion interferes in any respect with the functions of circulation and respiration; for, although true adhesion may not for a time create much inconvenience, its effects are ultimately fatal, especially to the working classes. Dr. Hope mentions two characteristic signs of chronic pericarditis, viz.: 1, the heart, though enlarged, beats as high up as natural, and sometimes occasions a prominence of the cartilages of the left precordic ribs; 2, an abrupt jogging or trembling motion of the heart, very perceptible in the precordial region

with the cylinder. This last sign is more distinct when the heart is hypertrophous and dilated.

Functional Diseases of the Heart. — It is customary for writers on the diseases of the heart to divide them into organic and functional. The division is not a happy one, since it is neither based on physiology nor pathology. What, indeed, are the first evidences of organic disease but disorder of function? when are there functional disturbances without organic irritation? As explained, however, functional diseases of the heart are various abnormal actions of this organ, dependent — 1, on a peculiar susceptibility or irritability of this organ, innate or acquired, by which common stimulants irritate it; and, 2, on an excess in the direct customary stimulus, as of blood, or in the indirect or transmitted excitement from other organs; the organic texture of the heart all the while undergoing little if any appreciable change. The chief manifestations of these functional diseases of the heart are, irregular contractions of its cavities, or *palpitations;* deficient contractions, causing *syncope;* and exalted sensibility, giving rise to *neuralgia* and *angina pectoris.*

Palpitation we have seen to be a common symptom in several of the diseases of the heart, of avowedly organic origin and seat. It offers little that is distinctive; since it may accompany excessive nutrition or hypertrophy and inflammation of the organ, or simple irritability from a state of great feebleness, defective nutrition, and anæmia. It is only when we can put aside, in our diagnosis, any organic change by which palpitation could be kept up, that we assume this irregular action to be a functional disease. But this last postulatum being granted, it is still a matter for earnest and careful investigation before we can decide with tolerable accuracy the kind of derangement; for this may be from excess in the quantity of blood, from a too rich and fibrinous quality of this fluid, or from a poverty of blood and anæmia of the muscular tissue of the heart itself, or undue sensibility of the system of cardiac nerves. Hence the young, robust, and plethoric man may have palpitations, which will require venesection, reduced regimen, and repose for their removal; while, on the other hand, palpitation in a young chlorotic female would be aggravated excessively by this treatment, and could only be relieved by tonics, nourishing food, and tolerably active exercise in the open air. A third class of patients, again, will often present themselves, who would be injured alike by depletion or by stimulation, but whose cases will be treated successfully by sedatives — digitalis and colchicum internally, and counter-irritants externally.

But there are other and quite common causes of cardiac disorder besides those consisting of particular states of the blood or of the heart, and which will cause palpitation of this organ. These are gastric and intestinal irritation, or repletion, pulmonary and hepatic congestion, uterine disorder, inflammation of almost any viscus, or whatever interrupts the regularity of the circulation, and calls in

any way on the heart for additional contraction. Our diagnosis, therefore, of palpitations, even after we are assured that they have no organic source as far as respects textural alteration, must be quite imperfect until we have instituted careful inquiries, and made, as far as possible, our own observations on the rhythmic or abnormal discharge of the other functions of the animal economy with which the heart may be supposed to sympathise; and with which of them does it not hold sympathetic relations? Whoever has had a thorn or a needle retained in his hand or foot, or has suffered from paronychia, has felt his heart throb with undue force, and with no becoming regularity in consequence. He will remember, also, how prompt was the relief from this palpitation after the offending body was removed, and its immediate effect, local inflammation, had been subdued by a few leeches to the part, or by poultices. Acting on so clear a hint, the physician must always, when he finds a heart palpitating with undue force and irregularity in a person who is neither plethoric nor anæmic, direct his inquiries to the discovery of the thorn, in the shape of some hitherto hidden irritation of another and often remote organ. Often he will find 'the thorn' in the brain, some one or more of its faculties, either of propensity or sentiment, having been pierced and wounded, and thereby keeping up cardiac irritation manifested by palpitation. I need not enlarge on these suggestive hints, nor make an application to each set of circumstances for your government in the details of treatment, medical and hygienic. Your own intelligence may be safely trusted to guide you to the requisite conclusions. Need I say that on some points of cardiac palpitation our prognosis must be guarded, if it be not positively discouraging; as where the disorder is kept up by permanent obstacles, such as tubercular irritation, or malformation of the chest and deformed spine. To most of the palpitations in which the heart and its appendages are not structurally affected, the term *nervous* is applied. If used in this sense no harm can ensue; but if we persuade ourselves that the disease is only an unequal action of the nervous system, or depends on irregular innervation as a primary cause, in place of this being only a secondary one, itself developed by irritation or inflammation of another organ, we may be greatly misled in our indications of treatment. Even in that which would seem to be a case of decidedly nervous character, as when palpitation follows spinal irritation, it is not easy to say how far this latter is primary, or is itself the effect of the protracted but less potent irritation of some internal organ.

The physical signs of palpitation with anæmia, are thus described by Dr. Hope: — The impulse of the heart is less remarkable for force, than for an abrupt, bounding character, with throbbing of the arteries — often universal, and jerking pulse. Hence, this species of palpitation is more audible to the patient than perhaps any other, the sound appearing to rush through his ears, especially when he lies on his side in bed, and each arterial throb causes a movement of his pillow. Some are so sensible of the universal arterial throb,

that they can count the pulse by the mere sensation, particularly as experienced in the back, when resting against a chair.

When the anæmia is considerable, palpitation occasions a weak, soft bellows murmur in the aortic orifice,* with the first sound; and a corresponding whiff is heard in the carotids, subclavians, brachials, and other considerable arteries, especially when slightly compressed with the edge of the stethoscope, though this is not always essential to the production of the phenomena.

In the anæmic condition, a bellows murmur is often heard near the left nipple, even when no abnormal sound can be detected at the aortic valves; thus proving, says Dr. Pennock, that the regurgitation takes place through the mitral orifice.

Syncope. — In palpitation of the heart, whatever may have been the remote or exciting cause, the immediate agency is irregular excitement of the nerves, or unequal and extreme innervation. In syncope, on the other hand, this excitement is wanting, and the muscles of the heart are for the moment paralysed. The causes of this state are numerous; some purely mental, as fear and disgust; others physical, as pain, concussion of the nervous system from falls, blows, &c.; sudden and extreme abstraction of blood, suddenly taking the erect posture after long recumbency, especially if the patient be anæmic, or have been exhausted by hemorrhage or by long disease. The ordinary duration of syncope is from a few seconds to a few minutes; but, in some cases, it lasts for hours and even days, imitating death so perfectly as to lead those around to inter a yet living body. But in other cases the heart's action is not wholly suspended, though it is exceedingly feeble. In cases of suspended animation from apoplexy or drowning, it is highly important for us to ascertain whether the heart yet pulsates; for if it does, however feebly, we may anticipate a successful issue of our efforts at resuscitation. Syncope, when purely nervous, need seldom excite alarm; but when proceeding from organic disease of the heart it is at times the precursor to death itself. In another state of disease, as towards the decline of fever or violent phlegmasia, and after uterine hemorrhages, or even protracted labour, syncope of a fatal kind may be brought on by the patient imprudently sitting up to discharge the bowels, or to urinate, or for some other less warrantable purpose. The injunction in all these cases, not to rise, cannot be too urgent, nor too often repeated to all the parties concerned; patients, nurse, and friends near.

The *treatment* of syncope will be, first, a horizontal posture, or the head even lower than the rest of the body, the admission of fresh air, sudden dash of cold water on the face, startling the patient by

* It might, says Dr. Hope, be expected in the pulmonic orifice also; yet I have not been able to satisfy myself of its existence in this situation. Some cases, however, at present under my care, lead me to think that the point is open for farther investigation.

a sudden noise or even blow, as by slapping the back of the hand or arm with some force; the application of ammonia and other pungent odorous substances to the nose. In the syncope of newly-born children, whose face is pallid, different from asphyxia by oppression of the brain, owing to fulness of the bloodvessels, and which requires the flow of blood from the cut extremity of the umbilical cord, a cold dash on the chest, tickling the nostrils with a feather, a gentle compression and elevation of the chest with the hand, rubbing and slight titillation of the feet, ammonia, not too strong, to the nostrils, and, if need be, a moderately stimulating enema, even of warm water, will often suffice to restore animation. In extreme cases of syncope in adults, a dash of cold water from some height on the spine, and stimulating enemata, would be of service.

Neuralgia of the heart and *angina pectoris* are sometimes described as separate diseases, when, in fact, they are but different degrees of the same disease. If it should be said that in angina there are other states of the organ superadded to the mere irritation of the nervous tissue, the same remark may be made of common neuralgia, facial for example, in which there is distinct vascular excitement of contiguous parts associated with the disorder of the nerve.

Sudden and violent, distressing and alarming as are the paroxysms of angina pectoris, they often go off with the same rapidity in which they came on. Generally they are induced by some unusual exertion, as in walking up a hill with the wind blowing in the face, and especially exertion after eating, and mental emotions. At a more advanced period of recurring paroxysms, these are more easily excited, as by intense thought, the acts of eating, coughing, or exoneration of the bowels. At this stage of the disease it will even recur as the individual lies in bed, and especially on his awaking from his first sleep.

The *symptoms* of angina are so clearly described by Dr. Joy (*Library of Practical Medicine*), that I shall give them to you in his own words: —

The pain, which at first was confined to the chest and upper part of the left arm, reaching commonly only as far as the insertion of the deltoid and pectoral muscles, afterwards often extends along the ulnar nerve down the inside of the arm to the elbow, wrist, or even to the fingers. It occasionally, though rarely, affects the right arm also, the neck, and lower jaw towards the ear, causing a feeling of choking and difficulty of articulation; and may even reach, though this is much more uncommon, to the lower extremities. The pain often follows the course of the anterior thoracic nerves, more especially of the left side; and in females there is at times, from this cause, extreme tenderness of the breasts. In some anomalous cases the painful sensation has been known to originate in the arm, not being at all felt in the chest till a more advanced period of the disease.

The duration of the seizure at the commencement rarely exceeds a few minutes, though it may last for half an hour or an hour, and in the more confirmed stage of the affection the paroxysm may be still further prolonged.

The pulse is subject to great varieties, being in the slighter forms often but little affected; whilst in the protracted and more aggravated cases it is feeble, irregular, or intermittent in some, quick and strong in others; its derangements, which often continue to a certain degree in the intervals, being frequently accompanied by a marked tendency to syncope. The respiration is sometimes affected to such a degree, that the patient cannot continue in the recumbent posture: yet the difficulty of breathing, in the earlier stages more especially, is very unlike spasmodic asthma; for the patient, by an effort of the will, is still able to take a full inspiration, and sometimes finds a momentary relief from the effort. A patient of great strength of mind had been known to persist in walking, in spite of the vehemence of his sufferings; and his resolution has been rewarded by their speedy cessation. Others, again, have made a similar attempt without the like result; and we apprehend that where the attacks, as is so often the case, are connected with that excited and over-loaded state of the heart induced by muscular exertion, the experiment cannot be exempt from hazard, and especially so if any organic disease exist.

A critical inquiry into the value of the various opinions held by writers respecting the seat and precise organic cause of angina pectoris, does not comport with my plan or intentions at this time. It is sufficient to remark, on this subject, that all the alleged causes, such as ossification of the coronary arteries, deposition of fat in the heart, enlarged liver, a plethoric condition of the heart and great vessels, have been severally found in subjects who, during life, had not suffered from angina pectoris; and conversely this disease has killed; and yet none of the organic changes just mentioned have been found. For an investigation of the pathology of angina pectoris and cases illustrative of the phenomena and sudden turns and termination of the disease as well as treatment, I can confidently recommend to your perusal a valuable paper by Dr. Chapman in the *Amer. Journ. Med. Sciences*, vol. vii. This gentleman believes angina to be originally neuralgia of the pneumogastric nerve, which spreads subsequently to other nerves, and to those of the heart among the number; and he supposes that the immediate cause of the irritation consists in irregular or misplaced gout, inasmuch as recovery has been frequently known to come on, the gouty action being excited in the extremities.

Respecting the ætiology of angina pectoris, Dr. Hope makes some very judicious observations:—They who have ascribed angina pectoris to any particular cause to the exclusion of others, have, Dr. H. thinks, unquestionably taken too limited a view of the subject; as experience has fully proved that it may originate in various

causes. According to his own observation, it may originate in any cause, whether organic or functional, capable of *irritating* the heart, or of rendering it morbidly susceptible of irritation, and as structural disease of the organ has this effect more than any other cause, it is that on which the malady, in its severer forms, is most frequently dependent.

The *treatment* of angina pectoris will be conducted according to the notions entertained of its pathology. The proper course will be to take cognisance of all the probable and actual organic lesions which may precede and so often accompany the disorders of the heart. Preventive measures will be of most importance, and those directed to an avoidance of undue repletion, and especially at undue hours, and bodily exertion or mental excitement. Small bleedings and laxatives and sedatives may be required in some cases; active purging and low diet in others; tonics, and nourishing but not stimulating food in another class; and in all the occasional recourse to if not habitual use of counter-irritants. Laennec, who is not certainly prone to overrate the power of remedies, assures us that he has most frequently succeeded in alleviating the distress in angina by the magnet, so applied as to carry a magnetic current through the thorax. The alkaloids of the *ranunculaceæ*, such as the veratria and aconitine have proved on occasions quite serviceable in the hands of their original recommender, Dr. Turnbull. A belladonna plaster over the precordial region, renewed every week or ten days at farthest, procures considerable alleviation of the attacks.

When neuralgia of the heart occurs without the other concomitants of angina pectoris, as it sometimes does when alternating with neuralgia in other parts of the body, the treatment will be conducted on the same principle and by the same remedies as those in which we rely under this last mentioned circumstance.

Asthma has been at different times referred to by me in the preceding lectures as symptomatic of a diseased state of the bronchial membrane and pulmonary engorgement; and it was formerly so described in connection with dry catarrh. A frequent cause of asthma commonly unnoticed by the practitioner, is disease of the heart. Sometimes from this latter cause blood exists in the lungs in excess, giving rise to asthmatic oppression; as is the case when the right ventricle is hypertrophous, or the left side of the heart obstructed; or still more, when these two affections coexist: also, when the circulation is merely accelerated, as by palpitation, running, or by slighter efforts in corpulent persons. Sometimes, as Dr. Hope also remarks, blood does not enter the lungs in sufficient quantity; and this may arise from the weakness of the right ventricle, from an obstruction in its mouth, or from increased resistance on the part of the lungs; as, for instance, during sleep, when the respiratory function is less active.

The variety of asthma from diseases of the heart comprises, in Dr. Hope's opinion, by far the greatest proportion of the most

severe and fatal cases. Asthma from disease of the heart often imitates the characters of the other varieties; and this perhaps for a very simple reason, that the lungs are in much the same state as in those varieties. Thus, it is *humid*, or *humoral*, when there is permanent engorgement of the lungs, causing copious sero-mucous effusion into the air-passages, as in cases of contraction of the mitral valve. It is *dry*, when the engorgement is only temporary, as in cases of pure hypertrophy. It is *continued*, when there is a permanent obstruction to the circulation; and any of the varieties may be *convulsive*, when the heart has sufficient power to palpitate violently. The worst cases of convulsive asthma from disease of the heart are those of hypertrophy with dilatation and a valvular or aortic obstruction.

Asthma is, in fact, then, it will have been seen, but a symptom, or a series of symptoms, for the removal of which we must direct our remedies at the organic cause.

DISEASES OF THE NERVOUS SYSTEM.

LECTURE LXXXII.

Diseases of the Nervous System—Pathology of, unknown—Molecular change in the nervous centres—Difficulties of distinguishing arachnitis from encephalitis—General and partial cerebritis—Symptomatology of—Diagnosis of—Preservation of intellect in—Production of general symptoms by local lesion.

To-day we commence the consideration of the diseases of the nervous system, and here let me remark, that, even on the very threshold, we have to encounter several difficulties; some depending upon the great obscurity of the symptoms — some upon the want of correspondence between the symptoms and known organic changes, and some upon the necessarily imperfect nature of our classification of nervous affections. Many persons are in the habit of taking a limited view of the nervous system. They suppose that, when we speak of its diseases, we merely allude to affections of the brain and spinal cord; but the truth is, that the nervous system, so far as regards organization, is universal; and there is evidence to show that, even in parts and tissues which present no appearance of nerves or nervous communication, there resides a nervous power, either inherent in their organization or derived from external sources, and by the latter mode, of *nervous irradiation from surrounding tissues*, has the sensibility of serous membranes been supposed capable of explanation. But there can be little doubt that even these tissues present nervous expansions, though of an infinite delicacy. They are, we know, supplied with white vessels, and doubtless have nerves corresponding to their vessels in size and function — nerves, insensible to us in health, but, when inflammation elevates the organ in the scale, capable of transmitting the most

exquisite pain to the centre of perception. It seems, also, to be highly probable that nervous disease may commence not only in an affection of the brain or spinal marrow, but also in a similar condition of any part of the system. Again, if we admit the nervous system to be the governing and directing portion of the whole body, it is likely that some modification of that government *precedes* the alterations which take place in the circulatory and nutritive functions of other parts. Thus, in all diseases it may be laid down as a general rule, that there is an affection of the nervous system, either local or general; or, in other words, that there is no disease which we could name, which does not present signs of an affection of the nervous system, either *quoad* the suffering organ itself, or of an affection more general and diffuse. If we take, for instance, a case of gastritis or hepatitis, we find a lesion of function in the nerves of the respective organs, which, in certain cases, seems local; but, if the inflammation be intense and the fever high, we have superadded to this a sympathetic affection of the brain or spinal cord. The same thing applies to all forms of local disease; for in all there is an affection of the nerves, either confined to the suffering organ, or extending to the whole system.

In reviewing the phenomena of nervous diseases, we find them presenting several varieties depending upon certain circumstances. In the first place, they vary according to the seat of the disease. We find that the signs and symptoms of affections of the cerebro-spinal system differ very considerably from those which characterise diseases of the sympathetic nerves. Again, if we take any part of the nervous system, and examine its diseases, we find that here also there is a source of variation connected with the peculiar part affected. Thus, if we take the cerebro-spinal system, we find that disease of one part of it differs most essentially in symptoms from disease of another: we may have enormous and fatal disease of the spine without the slightest injury of the intellectual powers, but we seldom have disease of the brain, particularly of the surface, without a more or less appreciable lesion of the phenomena of the mind. To follow up this point, suppose we take the diseases of the brain itself, as compared with each other; we find that their symptoms vary according to the locality, so that, whether we look to physiology or pathology, we must consider the brain as consisting of several distinct parts, and not as an inseparable whole. It is admitted, by many writers of high authority, that there is a difference between the symptoms of disease affecting the periphery, and disease affecting the central parts of the brain; and there is reason to believe that we may be able, in many cases, to diagnosticate affections not only of the centre and periphery of the cerebrum, but even of other parts of the organ.

The same variety occurs with respect to the effects of diseases of the nervous centres. In some instances we have, as the result of disease of the brain, a loss of muscular power, or of sensation, in different parts of the body — sometimes affecting the face, sometimes one side, or even both; and these paralyses may be single or

variously combined. It appears, then, that the component parts of the nervous system, by being to a certain extent separate and distinct, furnish a very extensive source of variety in the phenomena of nervous affections.

Lastly, we have the varieties which depend upon the nature of the lesion. We generally observe an obvious difference between cases of nervous disease, accompanied by some *known change* in the injured part, and cases in which no such change can be demonstrated. Thus, for instance, we know the symptoms of apoplexy, and that, in the majority of cases, it is a disease connected with some perceptible change in the circulation of the brain — as excessive distension of its vessels, or an effusion of blood on its surface or into its substance. We also have some idea of the nature of inflammation of the brain; we know that its substance becomes at first red, then begins to soften, and finally is converted into a pulpy mass. Now, there are a number of symptoms which are so often and so constantly connected with peculiar organic changes, that, the symptoms being known, we can make a tolerably correct guess at the nature of the alteration, or *vice versâ*.

On the other hand, however, we have a large and important catalogue of nervous affections, in which the symptoms give but very unsatisfactory information as to the real nature of the disease, and to the elucidation of which the painful and long-continued investigations of the pathological anatomist have hitherto been directed in vain. Of the actual nature of a numerous, complex, and interesting class of diseases — the *neuroses* — we know nothing. All we can say of them is, that they are examples of lesions of function in various parts of the nervous system, presenting no trace of structural alteration *appreciable by our senses*. It is a startling fact, and one which must be a source of gloomy reflection to the pathologist, that many of the diseases of the nervous system, which present the most violent symptoms, are those in which there is the least perceptible organic alteration. Every man who has seen a case of hydrophobia, or tetanus, or mania, or epilepsy, has witnessed a train of extraordinary and horrible symptoms, infinitely worse than those which are seen to accompany even great organic alterations of the brain.

Here, then, is a singular fact: that there is a part of the system presenting a series of diseases under this extraordinary law, that the most violent and frequently fatal symptoms are accompanied by the least perceptible organic alteration. Now, what is the nature of these neuroses? To give you a familiar illustration, let us take a case of tetanus or hydrophobia as an example. Here we have a train of symptoms exhibiting the most frightful irritation of the nervous system; and yet, when we come after death to examine, with eager curiosity, the cause of all these appalling phenomena, what do we find? — nothing. There is no unequivocal, no constant, no prominent alteration of any part of the nervous system, to throw light upon the obscurity of our opinions, and enable us to fix

the nature or locality of the disease. We lay aside the knife in despair, and bitter indeed is the consciousness of our ignorance.

Two opinions have been entertained by pathologists with respect to those singular affections: one, that they are examples of some peculiar modification of the nervous influence, *independent of any organic change*. In other words, the pathologists who entertain this opinion hold, that the principle of life may be altered in its phenomena, and admit of modifications, independent of any molecular change. The supporters of this doctrine reason thus: — In the phenomena of neuroses we have a train of extraordinary and violent symptoms unconnected with organic change. Now, it is quite unphilosophical to say that there is organic change when we cannot see or demonstrate it; and, on the other hand, it is not absurd to suppose that we may have lesions or peculiar modifications of the nervous principle, without any organic alteration. The other opinion is, that in the neuroses there is some organic change, the nature of which cannot be ascertained, in consequence of our limited powers of detecting elementary changes. In whatever light we view this question, it appears to be surrounded with difficulties. No one can deny that neuroses are very different from organic diseases of parts. If we compare them with that class which is most familiar to us — the inflammatory affections — we find a remarkable difference. In the first place, the neuroses may be brought on by causes not reckoned among those commonly capable of exciting inflammation. In the next place, their invasion is sudden, and their progress rapid; they arrive at their *acmé* in a very short period of time, and subside rapidly. These are characters which do not belong to the ordinary forms of organic disease. Again, we often observe the utmost intensity of nervous pain without the coexistence of swelling, redness, or heat of the part affected. We find, too, that they are not to be subdued by the antiphlogistic plan; on the contrary, several of them are either relieved or cured by an exactly opposite line of practice; and many cases, which would appear to demand the lancet, are known by long experience to be most benefited by stimulants. Lastly, the most accurate and well conducted investigations of pathological anatomy have failed in demonstrating the slightest organic change in these cases—at least, where changes are found, these are *neither constant, competent, nor commensurate with symptoms;* so that, whether we compare the information we derive from symptoms, or the result of pathological anatomy, we find a great difference between neuroses and organic diseases. It may be said that, though they are not inflammatory affections, they have some resemblance to them. This, however, is only a gratuitous supposition; for, even in the very worst cases, they present nothing analogous to the results of inflammation, and the brain and spinal cord are as free from perceptible organic change, in the majority of cases of fatal tetanus and hydrophobia, as they would be in nervous affections of a slight and transient character.

You may have been already convinced that it is difficult to form any clear or definite notion of the nature of neuroses; indeed, the only thing we can say of them is, what they are not. When we reflect on nervous phenomena, and consider how occult, how mysterious the properties of those organs which give rise to them are, we are struck with astonishment at the discrepancy between cause and effect. No medical man has ever witnessed a case of confirmed tetanus or hydrophobia without being oppressed with a conviction of the imperfect and limited state of our knowledge of nervous disease.

It may be very possible, that in these neuroses the change, though so slight as to escape our means of detection, does absolutely occur; and yet such is the nature of nervous phenomena, that we must admit that great and extraordinary effects are produced by very slight causes. Do we see anything like this in nature? — any remarkable alterations in properties depending upon apparently slight causes? We do — we see extraordinary changes taking place in the characters of various inorganic substances, (to which I need not particularly allude,) and there is no reason why the same thing should nor occur in organic structures. On considering the doctrine of Isomerism, I should be inclined to think that it throws some light on this obscure subject. In chemistry, it is a well-known though singular law, that the properties of two bodies may be essentially different at the same time that their respective component elements are, as far as our knowledge goes, identically the same; and the change, whatever it may be, appears to result, not from the abstraction or removal of any of the component atoms, but from their peculiar juxta-position. Now, it being admitted in chemistry that many bodies having the same constitution possess totally different properties, and this difference being explained by the different position of their elements, it does not seem strange if the same thing should take place in the phenomena of organized beings; and, if this be the case, we have a key towards elucidating the nature of these neuroses, and can conceive how an analogous change — a difference in the arrangement of the molecules of the component parts of the nerves, or their centres — may produce new modifications of their properties, without making any distinct change in their nature, or adding or abstracting a single organic molecule. I am much inclined to adopt the opinion of those who think that, in the neuroses, a peculiar organic change actually takes place, though we cannot demonstrate its existence; because, to reason on the phenomena of animal life, independently of organization, is to plunge blindly into hypothesis, and retrace the errors of an antiquated and exploded school.

In treating of the diseases of the nervous system, I regret that time will not permit me to enter into the subject as fully as I could wish; all that I hope to be able to accomplish is, to give a sketch of some of the more prominent affections. The arrangement I purpose to adopt is the following: — 1st, I shall treat of local inflam-

mations of the brain; 2d, of general inflammations of that organ; 3d, of mere sanguineous congestion or hyperæmia of the brain; 4th, of apoplexy; and 5th, of the various forms of paralysis.

In taking up the subject of cerebral inflammation, I beg leave to observe, *in limine*, that the brain may be attacked by general or local inflammation; and further, that it may, as stated in books, be inflamed in its membranes or in its substance, or in both together. A great deal has been written to show that we can distinguish, during life, between inflammation of the substance and of the membranes of the brain. On this point, I believe, we may come to this conclusion — that inflammation of the membranes of the brain, or arachnitis, may be distinguished from some cases of local inflammation of the cerebral substance, but that it cannot, in the present state of our knowledge, be distinguished from *general* inflammation of the brain. We can, in most instances, make a distinction between local disease of the brain and arachnitis; but, when the whole substance of that organ is affected, our means of diagnosis fail. This, however, is not so much to be regretted, as the distinction is of very little consequence, so far as treatment is concerned. Here we arrive at the knowledge of a principle highly consolatory in the practice of medicine; namely, that in many acute cases where the diagnosis between two diseases of neighbouring parts is difficult or impossible, it is also, so far as regards immediate treatment, unnecessary.

If we inquire what are the symptoms of membranous inflammation of the brain, as laid down in books, we shall find them to be the following: pain, delirium, convulsions, alteration of sensibility, and coma. These are the symptoms which are generally given as characteristic of arachnitis; and it is quite true that they are observed in many cases of the kind. But the person must be dull indeed who thinks that such symptoms imply nothing more than an inflammatory affection of the membranes of the brain. Take, for instance, one of the most prominent symptoms — delirium; what does this imply? — that the portion of the brain which discharges the functions of intelligence or mind has been injured, and is rendered incapable of performing its office. No one will venture to assert that the membranes of the brain are the organs of thought, and that the delirium proceeds from *their* morbid condition: such a notion as this could not be entertained for a moment. What, then, are we to suppose? One of these two things — either that there must be inflammation of the substance as well as of the membranes, or that the substance of the brain must be affected in a neurotic manner without any actual inflammation. As far as delirium is concerned, it appears to me to be quite impossible to distinguish between inflammation of the brain generally, and of its membranes. The same rule applies to the other symptoms — convulsions, alteration of sensibility, and coma. I repeat, that all we can say on this subject is, that, in such cases, there is either inflammation of the substance as well as the membranes of the brain, or that, with the

membranous inflammation, there is a neurotic condition of the substance of the brain. Yet who, in such cases, can affirm with certainty that the symptoms of derangement of the substance of the brain are merely neurotic, when inflammation is admitted to exist within the cranium, and when we know that the two inflammations commonly coexist?

The fact of delirium occurring so frequently in inflammation of the membranes of the brain, is of considerable importance, as showing, not that membranes of the brain have anything to do with intelligence, but as supporting the opinions of those who believe the periphery of the brain to be the seat of the intellectual faculties; and here is a fact which, as far as it goes, is in favour of the doctrines of phrenology. If we compare those cases of cerebral disease, in which there is delirium, with those in which it does not occur, we shall find that it is most common in cases where disease attacks the periphery of the brain, as in arachnitis. The cases in which we observe great lesions of the brain without delirium are generally cases of deep-seated inflammation of a local nature, or inflammation of those portions of the brain which the phrenologists consider not to be subservient to the production of mental phenomena. This fact, also, would seem to confirm the truth of the opinion of the difference in function between the medullary and cortical parts of the brain. It is supposed that the cortical part of the brain is the organ of intelligence, while the medullary portion performs a different function. It is, however, a curious fact, that in delirium the inflammation is generally confined to the surface of the brain, and that, in cases of deep-seated inflammation, the most important symptoms are those which are derived from the sympathetic affections of the muscular system.

Partial encephalitis may be either primary or secondary. An example of the latter is that inflammation of the substance of the brain which supervenes on apoplectic effusion, tumours, or cancer. What we generally observe, in a case of this kind, is more an alteration in the functions of the muscular system, and less of the intellect. This alteration consists at first in an apparent increase of innervation in certain muscles of the body, and we generally find that one of the earliest symptoms of local encephalitis is the occurrence of pain in some of the muscles of the extremities. This is a curious fact, but one which is well established. In partial encephalitis there is often but little, or even no pain in the head; and the only warning we have of the approach of cerebral disease is the occurrence of pain in the extremities, followed by rigidity. Here are the two most prominent symptoms of the disease — pain in the muscles of the extremities, and then rigidity. Further, we have alternate spasms and relaxations of the muscles, in which, however, the power of the flexor muscles ultimately prevails; so that, if the disease be in the forearm, it may become permanently flexed on the arm, and the contraction of the fingers is sometimes so great as to drive the nails into the flesh. If it affects the leg, the heel may

be pressed against the buttock sometimes so forcibly as to form a sore. As the case proceeds, the limb becomes more fixed in its new position, and every attempt to extend it causes pain. During the prevalence of these symptoms, it frequently happens that the patient does not feel pain in the head, or any diminution of intellectual power. The absence of pain in the part affected may be accounted for by recollecting that it is a general law, that all inflammatory affections of deep-seated parts are, to a certain extent, of a comparatively painless character; and we may account for the non-existence of any lesion of the mind, by remembering that the disease is partial, and confined to a portion of the brain which appears to have little or no connection with the intellectual functions. In cases of this kind, when the muscles of the face are affected, the phenomena are interesting, from their being (*in the first stage*) the reverse of those of apoplexy. The face is drawn *from* the affected side, and the tongue pushed, by the opposite half of the genio-hyoglossus muscle, *to* the affected side. This is the spastic stage, when complete disorganization has not yet occurred. But when this happens, then the phenomena of the face are like those of apoplexy, because the opposite muscles, which were in a spasmodic, are now in a paralysed state; so that the face is drawn *to* the affected side, and the tongue pushed *from* it, by the healthy action of muscles which are deprived of their antagonists.

I mentioned before that delirium may not occur during the course of a partial encephalitis; and I gave, as a reason for this, the circumstance of the disease being of small extent, and confined to parts of the brain which do not discharge any of the functions of mind. Another explanation has been given, drawn from the consideration of the double nature of the brain. It is thought that, where disease exists in one part of the brain, sanity may be still preserved in consequence of the healthy condition of the corresponding part; but where disease attacks both hemispheres together, as in a case of arachnitis, then there is a distinct lesion of the mental faculties.

The next stage of partial encephalitis is that in which the diseased portion of the brain breaks down, softens, and is converted into purulent matter. This stage is marked by a new train of symptoms. The first stage is characterised by pain occurring in the muscles of the face, or of the extremities of either side, and followed by great rigidity. The second stage is of a different character; the rigidity and spasm of the muscles diminish, and are succeeded by a paralytic and flaccid state of these organs. Voluntary motion on the affected side now becomes impossible, the organ on which it depends being destroyed. Now let us, for sake of arrangement, call the first, or spastic condition, the convulsive paralysis, and the second, the paralysis with resolution. In the first, or convulsive stage, the brain is affected in the first degree; it is labouring under irritation or actual inflammation, and the disease still holds out a tolerably fair prospect of relief or cure. But in the

second stage a cure is impossible, and hence it is a matter of the greatest importance to commence our operations at an early period; and, by having recourse to prompt and active treatment, give the patient every chance for a cure.

In the partial inflammation of the substance of the brain, sensation is variously altered. In some cases motion is lost, while sensation remains intact; in others, sensation is partially or wholly abolished. In many instances the intellectual powers remain in all their integrity, or but little impaired, even after the occurrence of symptoms which mark the softening down of the substance of the brain, and its conversion into purulent matter. In a few there is, during the first stage of the disease, a slight alteration in the state of the intellect, marked by a certain degree of excitement or exaltation of the mental faculties, and this, on the supervention of the second stage, is exchanged for a state of depression. In fact, the morbid phenomena of the mind and of the muscular system, where they coexist, appear to be regulated by the same laws. Where the disease is extensive, you can easily observe the injury of the mental faculties which accompanies the second stage; the patient answers slowly when questioned; his memory is weak, and his countenance has a stupid expression. But cases, even of extensive local suppuration, have been described by various authors, in which there was no lesion of the intellectual functions observed. These, however, generally admit of an explanation. Thus, in the cases recorded by Lallemand, the abscesses were situated in the cerebellum, pons Varolii, and other parts which are not supposed to have any connection with the phenomena of mind. There are several well-authenticated cases of extensive disease, not only of these parts, but even of the substance of the hemispheres, occurring without any appreciable lesion of the intellect. Thus, Mr. O'Halloran gives the case of a man, who, after an injury which destroyed a large portion of the frontal bone, had extensive suppuration of the brain, and lost an enormous quantity of the substance of one of the hemispheres, and yet preserved his intellect entire up to the moment of his dissolution. There is some difficulty in explaining this. It is an opinion entertained by some physiologists, that when one hemisphere is diseased, its functions are discharged by the other; and that, the brain being a double organ, disease of one side does not impair the functions of the other. But, in answer to this, it may be urged that there are many cases on record in which disease of *a single hemisphere* has produced great alterations of intellect. The supporters of the former opinion attempt to explain such cases in this way. They state, that in the majority of such cases there was, besides the local encephalitis, inflammation of the arachnoid membrane, and that the lesion of intellect was not so much the effect of local disease of the brain as the result of its complication with an arachnitis engaging the whole periphery of the organ. In the next place, they explain the fact of a *general* affection of the brain arising from *local* disease, as depending in most cases on the pressure which the tumefied

state of the diseased portion necessarily makes on the second hemisphere; and they state that this pressure must be very considerable, as the brain, being confined within a bony cavity, has no power of expanding itself. Now, it is a most interesting fact, in support of this view, that, in a great number of the cases of loss of brain with preservation of intellect *all through the case*, an extensive opening existed in the bones of the skull, so as to permit of expansion in the diseased hemisphere, and prevent the pressure being exercised on the opposite one. This point appears to be borne out by the result of Mr. O'Halloran's cases, and by many other examples. Lastly, in every acute case of local inflammation of the brain, two causes having a tendency to produce symptoms exist. One of these is the local disease which gives rise to those phenomena of motion and sensation which we observe on the opposite side of the body; the other is the determination of blood to *the whole brain*, the result of the irritation of that disease. — "*Ubi stimulus ibi humorum affluxus.*"

LECTURE LXXXIII.

ENCEPHALITIS, diagnosis of—Preservation of function with organic disease—Vicarious actions of parts—Importance of pathology to phrenology—Use of pathology to phrenologists—Arachnitis at the base of the brain—Symptoms of—Influence of age over the intellectual faculties—Opinions of Bouillaud, Serres, and Foville —Influence of the optic thalami and corpus striatum on the motions of the extremities—Diagnosis of disease of the cerebellum—Connection with the generative system—Remarkable cases of.

WE were occupied at our last lecture in considering some of the phenomena of partial encephalitis, by which is generally meant a localised inflammation of the deep-seated parts of the brain; because superficial inflammation of the cerebral substance is very rarely partial. I endeavoured to show that the diagnosis of this local encephalitis was to be drawn, in a great measure, from the occurrence of pain and muscular affections of *one side of the body;* in other words, that the phenomena of this disease were partial, so as to give us at once a distinction between general and partial inflammation of the brain. In cases of general inflammation, we have convulsions of both sides — delirium and coma; in the partial form these symptoms are absent until complication takes place. Thus the supervention of delirium, or of convulsions on both sides, in a case where previously the signs of only *partial* encephalitis existed, would point out, in all probability, an extension of disease to the opposite hemisphere. I also endeavoured to point out the different modes in which partial encephalitis might be accompanied with symptoms of a general character, or affecting both sides; that there might be a coexisting inflammation of the membranes; or that the pressure of the diseased on the healthy hemisphere of the brain might be the cause of the complication. I stated, that some

of the most remarkable cases of extensive destruction of the brain, without perceptible injury of the mental powers, were those in which a traumatic opening in the skull gave full scope to the swollen parts, and obviated the effects of pressure on the sound hemisphere. I also observed that, in cases of local affections of the head, there are two causes which have a tendency to produce general symptoms. One of these is the cause which determines the pain and muscular affection of the opposite side; the other is the general determination of blood to the head; so that we may have cases in which the *actual inflammation* is limited to a part of one hemisphere, and yet, from the general determination of blood to the head, we may have coma and general symptoms.

To return again to the interesting consideration of great loss of cerebral substance with preservation of intellect, I have to remark, that this circumstance is one which some persons might quote against the opinion that the brain was the organ of intelligence; and I believe this fact has been laid hold of by the opponents of phrenology, and put forward as a powerful argument against the truth of its doctrines. Thus, for instance, in the case of Mr. O'Halloran's patient, who lost a large portion of one hemisphere, and yet, with all this mischief, the powers of the intellect remained unimpaired; it would not seem strange if a person should say, here is vast destruction of substance without any lesion of intelligence; how, then, can the brain be considered as the organ of thought? But let us look at this matter in its true point of view. In the first place, it is to be remembered that cases like this are rare — that they are to be considered as the exception and not as the rule. I have already shown you, that it is a law in pathology that lesion of structure and lesion of function are not always commensurate. This law applies to the brain as well as to all the other organs. To say that the brain was not the organ of intelligence, because in cases of entensive cerebral disease that intelligence was preserved, is false reasoning. A man will digest with a cancerous stomach; is it to be argued from this that the stomach is not the organ of digestion? I have seen the liver completely burrowed by abscesses, yet the gall-bladder was full of healthy bile. I have seen one lung completely obliterated, and yet the respirations only sixteen in the minute, and the face without lividity. What do these facts prove? Not that the health of organs is of no consequence, but that with great disease there may be little injury of function.

By reference to the original laws of organization, we may (in some cases at least) arrive at an explanation of this fact. You know that organs are primitively double; and we find, that though the fusion at the median line is produced by development, yet that the symmetrical halves still, to a certain degree, preserve their individuality. Thus we see how the laws of organization affect the phenomena of disease, and recognise a provision, acting from the first moment of existence, against the accidents of far distant disease.

Now, admitting that the brain is the organ of thought, we may suppose that, as in case of partial obstruction of the lung from inflammation, the remainder of the organ takes on an increased action, so as to supply the place of that which has been injured or destroyed. We know that if one lung be hepatised, the other takes on its functions, and carries on the process of respiration for a time. That this is the case, is shown, first, by life being continued, and, secondly, by the stethoscope, which informs us that the respiration of the lung, which has a double duty thrown upon it, is remarkably intense, proving the force of its action; and it has been further established, that the lung which thus takes on a supplemental action may become enlarged and hypertrophied. May not this also occur in the brain. There is no reason why such a pathological phenomenon, occurring in one viscus, may not also take place in another. But the opponents of phrenology say, supposing the organ of causation to be destroyed, how can the person continue to reason? It strikes me that the only way in which we can account for this is, by supposing that other parts of the brain take on the functions of those which have been injured or destroyed. Nor is there anything extraordinary or anomalous in such a supposition. We see, almost every day, examples of this kind. We see that in certain diseased states of the liver, accompanied by suppression of its secretion, its functions are assumed by other parts, and bile continues to be separated from the blood by the kidneys, salivary glands, and by the cutaneous exhalants. Here is a remarkable case, in which the glands and other parts take on the performance of a function totally different from that in which they are ordinarily employed. We find, also, that when the urinary organs are obstructed, urine, or its principles, are discovered in parts of the system where we should not at all expect them. Thus we have a very remarkable case detailed in the *American Journal of the Medical Sciences*, in which we find that a young female, who laboured under paralysis of the urinary organs, discharged urea from almost every part of the body, even from the ears. Neither is there anything very extraordinary in this. In several instances of suppression of the menstrual discharge, do we not see a vicarious secretion taking place from the surfaces of parts the most distant, and unconnected with the uterine system? It is a well-established law, that when the functions of organs are suspended or destroyed, other parts will often take on the action of the injured viscus. Now, supposing that a portion of the brain is to be looked upon as the organ of causation, and such portion is injured or destroyed, there is no reason why the remaining sound portion of brain should not take on, at least to a certain extent, in addition to its own, the functions of that part which has been injured. If, independently of any phrenological views, we admit the brain to be the organ of thought, there is no reason why we should not admit that the loss of intellectual power, produced by lesion of one part, may not be supplied by an increase of activity in the remaining portions. It in only by a supposition of this kind

that we can account for the preservation of the integrity of mind in many cases of disease of the brain. If we admit the phrenological doctrines, we can suppose that when one organ is injured, another may take on an additional function, and in this way preserve the integrity of the intellect; so that, whether we reason from phrenology or not, the continuance of soundness of mind, in cases of injury of the brain, can be understood when you come to contrast it with other analogous pathological facts. I again repeat, that it is not more extraordinary that, in case of local injury of the brain, the sound parts should take on a supplemental action, than that bile should be eliminated by the salivary glands, skin, and kidneys, or that the principles of urine should be discharged from almost every part of the system, or that a vicarious discharge from the roots of the hair should supply the place of the uterine secretion.

On this subject, one point should be always borne in mind, viz., that we may be wrong in saying that a patient is *quite sane*, while he is still an invalid and in bed. Unless we can show that after his recovery, and in his various intercourse with the world, he preserves his original intelligence, it would be wrong to assert that there has been absolutely no lesion of intellect consequent on the affection of the brain. While lying at ease in bed, and unaffected by any moral stimuli, he may seem to possess a sound condition of mind; he may put out his tongue, or stretch forth his hand, when requested; he may give an accurate account of his symptoms, and answer all the ordinary medical interrogatories with precision. But you are not, from this, to conclude that he is perfectly sane. Many persons, under these circumstances, have died in bed, and appeared to preserve their intellect to the last; but in such cases, the test of sanity, *intercourse with the world*, could not be fairly applied, and hence I think that there are not sufficient grounds to pronounce a decided opinion as to the real condition of the intellect in such cases.

Before I quit this part of the subject, I wish to make a few remarks on the doctrines of phrenology. There can be no doubt that the principles of phrenology are founded on truth, and, of course, highly deserving of your attention, as likely, at some future period, when properly cultivated, to exercise a great influence over medical practice. The great error of the phrenologists of the present day, consists in throwing overboard the results of pathological anatomy. If a pathological fact is brought forward, as appearing to bear against the validity of their opinions, they immediately exclaim, "we dont recognise any fact or principle drawn from disease; our science has to do with the healthy, and not the morbid, condition of the brain." Now, this is altogether absurd. Phrenology, if true, is nothing but the physiology of the brain, and pathology is nothing but the physiology of disease. Phrenology must be tested by disease as well as by health, and if it does not stand the test of pathology, it is wrong. If phrenology be a science founded on truth, if it is a true physiology of the brain, or of that portion of

it connected with mental phenomena, one of two results should obtain — either that it should be confirmed by pathology, or that the difficulties, which pathology presents, should be explicable in a manner consistent with the science. The phrenologists, in my mind, are doing a direct injury to the cause of their science, by their unnecessary and ill-timed hostility to pathology. It is idle to say, as they do, that theirs is the science of health, and that it is unfair to apply to it the test of disease. From pathology is drawn a host of facts, from which the doctrines they profess derive their principal support. The mere phrenologist, who understands not and despises pathology, is nothing better than a charlatan, and professes a science which he does not comprehend. If he would recollect that the brain in a state of health is most, and in a state of disease least adapted to the purposes of thought, he would see that this is one of the strongest arguments in favour of his doctrine, that the brain is the organ of mind. The more healthy it is, the fitter it is to discharge the functions of intellect, and *vice versâ;* yet phrenologists are so absurd as to think that pathology has nothing to do with their science.

But besides confirming the doctrine that the brain is the organ of thought, there are innumerable facts drawn from pathology, which have a tendency to prove that particular parts of the brain are the organs of peculiar phenomena. We see an injury on one part of the brain accompanied by a train of symptoms indicating some peculiar lesion of mind; we see an affection of another part, attended by a different class of phenomena. Here pathology, the science which phrenologists reject and despise, goes to establish the groundwork of their doctrines, that the brain consists of a congeries of parts, having each a separate and distinct function. We find, for instance, that disease of one portion of the brain affects the intellect; of another the generative organs; of a third, the muscular system. What does this prove but that the brain is not a simple organ, but composed of a congeries of parts, each of which governs a different part of the system, or ministers to a peculiar purpose? Now, what is this but what the phrenologists themselves wish to prove?

Further, the professors of phrenology have placed all their organs on the surface of the brain, and for this they have been loudly censured. Phrenology, it is urged, knows, or professes to know, nothing about the central parts of the brain, which must be equally important with the superficial, and have confined their investigations to the surface alone. Now, it is a curious fact, that the pathology which they deny, in this instance, furnishes the best reply to this objection. I mentioned, at my last lecture, that if we examine the symptom of delirium, we find that it characterizes the inflammation of the periphery, and is commonly wanting in that of the deep-seated portions. In other words, mental alienation is the characteristic of the disease of that portion of the brain where the phrenologists have placed the intellectual organs. Here is a strong fact in favour of the doctrines of phrenology, derived from that

science which the mere phrenologist throws overboard and despises. Again, according to the researches of some celebrated French pathologists, there are a number of facts to show that there is a remarkable difference between the symptoms of arachnitis of the convexity and of the base of the brain. This conclusion, which, after a most careful series of investigations, was adopted by them, is borne out by the results of my experience, and appears to me to be established on the basis of truth. They have discovered that arachnitis of the convexity of the brain is a disease characterized by prominent and violent symptoms, early and marked delirium, intense pain, watchfulness, and irritability. We have first delirium, pain, and sleeplessness, and then coma. But in arachnitis of the base of the brain, the symptoms are of a more latent and insidious character; there is some pain, and the coma is profound, but there is often no delirium. What an important fact for the supporters of phrenology is this, and how strikingly does it prove their absurdity in rejecting the lights derived from pathology? Here we find the remarkable fact, that inflammation of the arachnoid, investing the base of the brain to which the phrenologists attach, comparatively, no importance, is commonly unattended with any lesion of the intellectual powers, while the same inflammation of the convexity is almost constantly accompanied by symptoms of distinct mental alienation.

It is objected to the phrenologists that they know little or nothing of the central parts of the brain; that though these parts may be fairly considered to be of as much importance as any others, still they do not admit them to be organs of intellect. Now, what does pathology teach on this subject? It shows that we may have most extensive local disease of the central parts of the brain — that we may have inflammation, suppuration, abscess, and apoplexy, without the slightest trace of delirium. Indeed, there can be no doubt that the central portions of the brain have functions very different from those on the surface. They appear more connected with another function of animal life, muscular motion and sensation. Then let us examine the phenomena of old age. Every one is familiar with the fact, that when a man arrives at an extreme age, he generally experiences a marked decay of intellectual power, and falls into a state of second childhood. Does pathology throw any light upon this circumstance? It does. From a series of ingenious and accurate investigations, conducted by two continental pathologists, Cauzevielh and Desmoulins, it has been found that a kind of atrophy of the brain takes place in very old persons. According to the researches of Desmoulins, it appears that, in persons who have passed the age of seventy, the specific gravity of the brain becomes from a twentieth to a fifteenth less than that of the adult. It has also been proved that this atrophy of the brain is connected with old age, and not, as it might be thought, with general emaciation of the body; for, in cases of chronic emaciation from disease in adults, the brain is the last part which is found to atrophy; and it has been

suggested that this may explain the continuance of mental powers, during the ravages of chronic disease; and also the nervous irritability of patients after acute diseases, in which emaciation has taken place.

I might bring forward many other facts to show that phrenology is indebted to pathology for some of the strongest arguments in its favour; and I think that those phrenologists who neglect its study, or deny its applicability, are doing a serious injury to the doctrines they seek to establish. The misfortune is, that very few medical men have turned their attention to the subject; and that, with few exceptions, its supporters and teachers have been persons possessing scarcely any physiological, and no pathological, knowledge. Phrenology will never be established as a science until it gets into hands of scientific medical men, who, to a profound knowledge of physiology, have added all the light derived from pathological research. To give you an instance of the mode of reasoning of the non-medical phrenologists. In their drawing-room exhibitions, they appeal with triumph to the different forms of the skull in the carnivorous and graminivorous animals, with respect to the development of destructiveness; and all are horrified at the bump on the tiger's skull. But, as Sir H. Davy well observes, this very protuberance is a part of the general apparatus of the jaw, which requires a more powerful insertion for its muscles in all beasts of prey. Phrenology, as generally taught, may answer well for the class of dilettantis and blue-stockings, or for the purposes of humbug and flattery; but its parent was anatomy, its nurse physiology, and its perfection must be sought for in medicine. The mass of inconsequential reasoning, of special pleading, and of "*false facts*," with which its professors have encumbered it, must be swept away, and we shall then, I have no doubt, recognise it as the greatest discovery in the science of the moral and physical nature of man that has ever been made. I feel happy, however, in thinking that, of late, the science has been taken up on its true grounds, in Paris, London, and Dublin. Vimont's splendid work on *Comparative Phrenology* will form an era in the science. In London, Dr. Elliotson has directed the energies of his powerful mind to the subject; and in Dublin we have a Phrenological Society, of which Dr. Marsh is the president, and my colleague, Dr. Evanson, the secretary; and under such auspices, much is to be expected.*

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* [As a valuable contribution to the science of anthrophology, the great work, *Crania Americana*, by Dr. Samuel George Morton, deserves special notice and consideration. Though not prepared in the spirit, it furnishes important illustrations of phrenology. The author, in his dedicatory epistle to Mr. John S. Phillips, says: — "You and I have long admitted the fundamental principles of phrenology, viz., that the brain is the organ of the mind, and that its different parts perform different functions; but we have been slow

Having drawn your attention to the ordinary symptoms of local encephalitis, our next inquiry is, how far we can diagnosticate the actual seat of disease from phenomena observed during the life of the patient. Do not suppose, for a moment, that this part of the subject is undeserving of your attention, in the strongest sense of the word. Recollect that the more accurate and extensive is diagnosis, the more certain and available is the practice of medicine. On this subject, matters are not altered to the same extent as in the cases of chest or abdominal diseases. In our knowledge of the two latter, we have made vast strides within the last few years; but in cerebral affections, though much has been effected, much still remains to be done; and it is not improbable that some of the opinions on this subject, still promulgated in schools, require correction. If we examine the various cases of cerebral disease on record, we find that in some the paralysis was complete, and that sensation and muscular motion became, as it were, annihilated. In other cases, the muscular system alone appeared to suffer; while in a third class we find that sensibility is destroyed, while the power of motion remains intact. Again, in some we have complete hemiplegia, in others the paralysis is but partial; in some the affection is slight and transient, in others it is incurable and permanent. The result of all this would appear to imply that there are different states and seats of cerebral disease, producing different modifications of nervous phenomena. It has been taught, that a paralysis of the organs of speech points out a lesion of the anterior lobes of the brain, and there are many cases on record in support of this opinion. Here is a pathological statement strongly in favour of the doctrines of phrenology. But, on the other hand, it must be confessed that there are numerous cases on record of lesion of the powers of speech, independent of any affection of the anterior lobe; and hence, so far as the diagnosis of lesion of the anterior lobe, derived from loss of speech, is concerned, we cannot make up our minds. You are aware that the phrenologists place the organ of language in the anterior inferior part of the brain. Now, when an affection of this portion of the brain is found to coincide with the loss of speech, it is all very well; but the difficulty is to account for those cases of loss of speech in which there is no appreciable lesion of the substance of the anterior lobe. In investigation on

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to acknowledge the details of cranioscopy, as taught by Doctor Gall, and supported and extended by subsequent observers. We have not, however, neglected this branch of inquiry, but have endeavoured to examine it in connexion with numerous facts, which can only be fully appreciated when they come to be compared with similar measurements derived from the other races of men. Yet I am free to acknowledge that there is a singular harmony between the mental character of the Indian and his cranial developments as explained by phrenology." — B.]

this point, however, you must bear the following distinction carefully in mind. The organ of language of the phrenologists is not properly the organ of the *power of speech*, but that by which, as it were, thought is converted into language. A man, from paralysis of his tongue, might be incapable of speaking; and such a case, existing without lesion of the anterior lobes, might be most unfairly quoted against the phrenologists.* Again, paralysis of the upper

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* [A very interesting discussion on this subject was held about two years ago, at a meeting of the *French Royal Academy of Medicine*. M. Bouillaud, in a memoir communicated fifteen years ago, had collected the details of sixty-four cases, to show that the phrenological organ of language is seated in that portion of the anterior lobes of the cerebrum which rests on the roof of the orbits, as first announced by Gall, and subsequently confirmed by the observations of Spurzheim and others. On the present occasion M. Bouillaud added the reports of thirteen other cases, which have come under his notice, and all of which, he thinks, tend to prove the correctness of the phrenological doctrine. He admits that several instances apparently opposed to this doctrine have been published by MM. Cruveilhier, Andral, Lallemand, and others; but he insists that the details of these cases have always been unsatisfactory, and never sufficiently complete for the purposes of an absolute decision.

MM. Richoux and Cruveilhier followed in opposition to M. Bouillaud, introducing, among other objections, that one, the fallacy of which has been pointed out by Dr. Stokes in the text — when he states: "The organ of language of the phrenologists is not properly the organ of the *power of speech*, but that by which, as it were, thought is converted into language." The phrenological faculty of language is certainly not the same as the faculty of speech or articulation. One is the memory of words; the other is the mere power of expressing or enouncing them.

M. Blandin advocated the opinion of M. Bouillaud and the phrenologists, and, in confirmation of them, related the following case: —

"A child received a musket-ball in the orbit; after destroying the eye it traversed the exterior orbitar plate, and made its escape just in front of the ear. This child, whom I saw at the Hôtel-Dieu several weeks after the accident, had lost all power of articulation. During its recovery, it was necessary to teach and accustom it to pronounce words. When it left the hospital, it was able to articulate its own name, and a few other words. Now in this case is it not highly probable that the superior orbitar plate was fractured, and that an inflammatory process had extended to the point of the anterior lobe which rests upon it?

"As to the objected cases, in which the lesion of other parts of the brain seemed to occasion a loss or some disturbance of speech, they prove nothing in my opinion against the opinion of M. Bouil-

extremities has been connected with disease of the optic thalami, and posterior lobes of the brain. It is the opinion of Bouillaud, Serres, and others, that the optic thalami regulate the motions of

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laud; for the corpus striatum and the thalami optici, for example, contribute by their irradiations to the formation of the anterior lobes; and the same may perhaps be said of the fibres of the upper part of the medulla spinalis, which are in truth the primary roots of these parts.

"On the other hand, even if it can be shown that in some cases, where there has been disease of the anterior lobes, the speech has not suffered, it may possibly be that the immediate seat *du principe coordinateur* was not involved in the lesion. M. Bouillaud has not affirmed that the whole of the anterior lobe presides over the faculty of language; a small portion of it only being, according to the phrenological views, the seat of this power.

"M. Martin Solon adduced the following cases from his own practice in confirmation of the same doctrine: —

1. "A girl had been for a length of time affected with slight impediment in her speech; gradually she lost the power of uttering even a syllable, and every movement of the tongue was lost. Symptoms of contraction and spasm came on, and she died. On dissection, besides the usual traces of chronic meningitis, several hydatids were found in the medullary substance of the anterior cerebral lobes.

2. "In another case, whose progress and general character had been very similar to those in the preceding one, there was found on dissection a well-marked softening or *ramollissement* of the anterior lobes.

3. "A young girl lost her speech after a severe attack of fever. When all the active symptoms had disappeared, frictions over the forehead with an ammoniated pommade were employed, and the speech gradually returned. Similar successes attended the use of the same means, in a case where the loss of speech followed a suppression of the catamenia.

"M. Gerdy expressed himself unsatisfied with such cases as those adduced by the preceding speaker.

"One single well-authenticated case of decided lesion of the anterior lobes, in which the speech was unaffected, is quite sufficient he thought to overthrow the phrenological doctrine. Now, many more than one such case may be adduced. Thus, in the remarkable instance reported by M. Andral, of a youth who suddenly lost his speech, sight, and intellect, all the symptoms disappeared after a certain time; the speech returned, and also the intellect and vision. Subsequently this youth died — the amendment having, however, continued to the last, — and on dissection the right anterior lobe of the brain was found to be excessively softened. M. Bouillaud himself is candid enough to acknowledge that it is a very

the upper extremities; and it is a fact, that in many instances of paralysis of the upper extremities, disease has been found in these parts. We might term the following a synthetic case, illustrative

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curious instance, and not easily explicable. Many other such cases are to be found in various pathological records.

"M. Ferrus, one of the physicians of the Bicêtre Hospital, replied to the observations of M. Gerdy. He was quite willing to admit that, while avowing his belief in the truth of the general principles of phrenology, he did not give his assent to every doctrine inculcated by its professors. He thought that it required many restrictions, and stood in need of not a few modifications; but in his opinion it had already thrown too valuable a light upon the functions of the brain to merit such reproaches as had been used by MM. Cruveilhier, Gerdy, Rochoux, &c., &c. He had satisfied himself by numerous researches that the faculty of language is really seated, or, in other words, has its material organ in the convolutions of the anterior lobes. I have, says he, over and over again observed, that in those persons who are gifted with a striking memory of words, and an aptitude for the acquisition of languages, the eyes are usually prominent and full, in consequence of the great development of the inferior portion of the anterior cerebral lobes. The lower part of the forehead, too, is usually projecting in such persons.

"My pathological observations have led to a similar result; and they are certainly not at all in accordance with those of M. Rochoux. I have, for example, repeatedly observed that, in the majority of cases where the speech had become affected after the delirium of insanity, the anterior and inferior convolutions of the brain exhibited striking alterations, either as to the consistence of their cineritious matter, or in the relations between it and its investing membranes, or in the more deeply-seated medullary substance. Three days ago I examined the body of an insane, almost idiotic, patient, who had become paralytic: for a length of time his speech had been confused, and his condition presented no chance of amendment. More lately his symptoms had become more acute and violent. The excessively congested state of the bloodvessels of the meninges and of the substance of the brain accounted for this aggravation; while the unusually strong adherence of the pia mater to the special convolutions — designated by Gall as the organ of language — afforded a rational explanation of the loss of speech in this case.

"M. Ferrus adduced two or three other similar examples in confirmation of the phrenological doctrine on this subject. He then alluded to the cases reported by Andral and others, which appear to be conflicting with these; and suggested that most of them are far from being conclusive, seeing that in by far the larger majority one organ only of the faculty has been injured, its fellow in the

of the doctrine: — "A soldier was wounded in the right shoulder with a lance, in consequence of which he got an aneurism of the axillary artery, for which an operation was performed. At the moment the ligature was tightened he experienced exquisite pain in the situation of the ligature, which extended to the brachial plexus; this continued until the next day, and then ceased. On the fourth or fifth day the pain returned with increased violence, and continued until the seventh day, when it became intolerable. He was blooded, but without any good effect; he then became comatose; his head was drawn backwards; he had alternations of stupor and excitement, and soon after expired. On dissection, the ligature was found to embrace some of the principal branches of the brachial plexus, and there was an abscess in the posterior lobe of the brain, extending to the optic thalamus." Here we have a case of injury of the upper extremity, and that portion of the brain which is supposed to govern it was found in a state of manifest disease. Serres gives, also, the details of some experiments in support of this opinion. On removing the posterior part of the right hemisphere of the brain in a dog, he found that the left anterior extremity became paralytic; he prolonged his incisions into the corresponding portion of the opposite hemisphere, and found that the right extremity became paralysed. In another dog he plunged a bistoury into the posterior part of the right lobe, and found that

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other hemisphere remaining the while almost or altogether intact. But even admitting that both organs have been found seriously altered, without the faculty of being deeply disturbed, such cases by no means afford so decisive an argument against M. Bouillaud's views, as some of my learned colleagues appear to imagine. Every pathologist knows how frequently different parts and viscera are found after death almost totally disorganized, which had given out during life no very decided symptoms of disturbance or disease. If this be true of the brain *en masse*, and of other organs, why may it not be equally so of parts of the brain?

"M. Bouillaud closed the discussion — which had continued during three *seances* of the Academy — by replying to the various arguments and facts which had been adduced by his opponents.

"Certainly we must acknowledge that the phrenological doctrine has on the whole very successfully resisted the attacks of its adversaries during this rather protracted ordeal, and that not a little merit is due to M. Bouillaud for his manly and able defence of his positions. Even M. Cruveilhier admitted that he did not combat *à priori* the localization of the faculties of the mind; moreover, that he willingly acknowledged the utility of phrenology, and the services which it had already conferred; but, continued he, 'I have not yet heard sufficient reasons to place the organ of language in one part of the brain to the exclusion of other parts.'" — *Gazette Médicale.* — B.]

the left anterior extremity became affected with convulsive motions. He then introduced into the wound a few drops of nitric acid, so as to produce inflammation of that portion of the brain, and observed that the convulsions of the left fore-foot became more violent; in fact, that the animal had all the symptoms of a local inflammation of the brain, namely, convulsions, rigidity, and then paralysis. Rolando has performed a series of experiments with the same view, and his conclusions are exactly those of Serres. So that, if we connect the results of these experiments with some facts drawn from pathology, we might conclude that the optic thalami, and posterior lobes of the brain, have a very important share in regulating the muscular motions of the upper extremity. I may here state, that, in this city, a case of a female occurred, who got an attack of severe pain in the left hand and fingers, which became afterwards contracted; and she had, in addition to this, alternate flexions and extensions of the fore-arm, *followed by resolution and paralysis.* On dissection, there was an abscess found in the right optic thalamus; the rest of the brain was healthy.

With respect to those cases in which there is paralysis of one of the lower extremities, it has been taught that it arises from disease of the corpus striatum. On the anterior lobe the following case is given by Serres:—"A woman, forty years of age, had an attack of apoplexy, from which she recovered with the left leg in a state of complete paralysis, and the left arm admitting of a slight degree of motion." Here was a case of lesion of both the upper and lower extremity on the same side, but in the former the paralysis was partial, in the latter complete. On dissection, it was found that two circumscribed abscesses existed in the substance in the right hemisphere, the larger situated in the *corpus striatum*, the smaller in the optic thalamus. Another case is given of a patient who got paralysis on the side; the muscular power of the arm being completely destroyed, while the leg retained a considerable degree of motion. In this case the *corpus striatum* was but slightly affected, while nearly the whole substance of the optic thalamus was destroyed. I have also to remark, that Serres performed similar experiments on the corpus striatum in dogs, and came to the conclusion, that it governs the motions of the lower extremities. The structure, extent, and special action of the corpus striatum and optic thalamus, are said to afford some explanation why, in ordinary cases of paralysis, the arm is more often affected than the leg, and does not recover so soon. The fact of the prolongations of the optic thalami being much more complicated and extensive than those of the corpora striata, is thought to explain their greater liability to disease.

There are, however, not unfrequent exceptions to this law; and it is not uncommon to meet with cases which militate against the doctrines laid down by Serres, and other pathologists, particularly so far as regards the connection between the *corpora striata* and the government of the lower extremities, so that I would have you look upon it as a point *by no means* fully established. The latest

observations on this subject are by Andral, who brings forward many facts opposed to the opinions of Serres, Foville, &c., &c. Out of seventy-five cases of accurately circumscribed disease of the brain, the disease being hemorrhagic, or otherwise, he found that in forty, where the paralysis existed in both extremities of one side, there were twenty in which nothing was injured but the anterior lobe, or the *corpus striatum;* while in nineteen the lesion existed in the posterior lobe, or the optic thalamus. In these seventy-five cases, also, were twenty-three in which one arm was paralysed. In these, eleven presented the disease in the anterior lobe, or in the *corpus striatum;* ten in the optic thalamus, or posterior lobe; and two in the middle lobe. Finally, out of these cases were twelve of paralysis of one arm; ten of these presented disease in the *corpus striatum*, or anterior lobe; and two only with disease in the optic thalamus, or in the posterior lobe.

These facts prove how uncertain the matter is yet. It would appear that when a simultaneous and equal injury of both corpora striata and optic thalami exists, it would be natural to expect complete paralysis of one side, and I believe there are some cases on record in support of this opinion. But when you have paralysis affecting both sides of the body, you are not to suppose that there is necessarily an affection of the *corpora striata* and optic thalami, for such symptoms, in the majority of cases, are found to depend upon either an intense congestion of the brain, or a large serous or sanguineous effusion. The same phenomena are produced by the pressure exercised by the diseased on the sound hemisphere, in a case of local encephalitis, or by disease affecting the upper part of the spinal cord.

With respect to disease of the cerebellum, the only means of determining its affections consists in first considering the seat of the pain, if any, and, in the next place, the effect on the genital system. There are a great number of cases detailed in various treatises in proof of the close connection between the cerebellum and the genital function. I shall relate a few of these. A man, aged thirty-two, got an attack of apoplexy, followed by violent erection of the penis, which continued until death; here we have a case of apoplexy accompanied by priapism. On dissection, the whole of the cerebrum was found healthy; but there was an apoplectic effusion in the middle lobe of the cerebellum.

Another case is given of a man, aged fifty-five, who died of apoplexy in a brothel, and who, after the attack, had violent priapism. On dissection, the substance of the cerebellum was found to be extensively destroyed, and there was an apoplectic effusion in the fourth ventricle. There is a remarkable case on record of a prostitute, in whom the clitoris was extirpated, as it was considered that it was the irritation of that organ which brought on a pernicious habit, by which her health was greatly impaired; and it was conceived that, as soon as the supposed source of excitability was got rid of, she would give up her vicious propensity, and be restored

to health. But in this instance it is probable that the effect was taken for the cause; for on her death, which took place some time after, the cerebellum was found to contain a number of chronic abscesses. Serres gives the case of a woman, who died of an apoplectic effusion into the cerebellum. During the fit, she had hemorrhage from the uterus; and, on examining that organ after death, a large clot of blood was found within its cavity, and the broad ligaments, ovaries, and, in fact, every part of the generative apparatus, were in a state of high vascularity. Yet this female was seventy years of age, and her menses had ceased at the usual period. There is a most important case bearing on this point on record. A gentleman, who was subject to constant and distressing nocturnal emissions, consulted his physicians, who, considering them to be the result of debility, prescribed various tonic and stimulant remedies. He used various preparations of iron, bark, camphor, opium, hyosciamus, nitric acid, and many other things of a similar kind, but without advantage. From the fact of the failure of all these remedies, and the circumstance of his having complained of an occasional sense of uneasiness in the back of the head, his physician was led to think that his symptoms might have some connection with an excited condition of the cerebellum; and, under this impression, had the back of the head shaved, leeched, and covered with a quantity of pounded ice. *From this time his symptoms began to decline rapidly, and in a fortnight he was quite free from complaint.* Now, this case, taken singly, would prove very little; but when we view it in connection with the number of cases in which disease of the cerebellum has been known to be followed by excitement of the genital organs, it becomes of considerable importance. I have now seen two cases in which this connection was observed. In a case of a young man, who was brought into the Meath Hospital some time ago with paraplegia, it was observed that the penis was in a state of constant erection, and there were continual seminal emissions. On dissection, an effusion of blood was found in the cerebellum, and another in the hemisphere opposite the paralysed side. There was another case of a patient who was attacked with apoplexy and paralysis of one side, but with the unparalysed hand he continued to attempt the act of masturbation, so that it was necessary to tie down his hand. On dissection, there were several effusions in the substance of the cerebellum. All these facts strongly go to prove the connection which subsists between the cerebellum and the generative function; and I think it would not be unsafe to make the diagnosis of disease of that organ in cases of cerebral disease, where the genital system was much excited.

[A case of this kind was published by Dr. Dunglison some years ago, which has been cited as a case of meningitis of the cerebellum by Dr. Abercrombie. A boy, aged five, pale and delicate, after having been slightly indisposed for four or five days, was seized,

on the 9th of August, with violent convulsions. On the 10th, there was fever with delirium; a vacant look of the eye, and an evident imperfection of vision, which appeared by his attempting to lay hold of objects that were presented to him, and missing them; the pupil was dilated, and there was slight strabismus. On the 11th, 12th, 13th, and 14th, the symptoms gradually increased. On the 15th, coma; constant motion of the right arm and leg; the left appearing to be paralysed. In the night, he was seized with violent convulsions, which continued till his death, which took place on the morning of the 16th. On dissection, the brain was found healthy. There was remarkable vascularity on the tuber annulare, forming a thick web of vessels. This was connected with the arachnoid coat of the right side of the cerebellum, which was thickened, with some deposition of coagulable lymph. About four ounces of fluid was found at the base of the skull, but not above a tea-spoonful in the ventricles.

An important point in this case, which Dr. Abercrombie appears to have overlooked, was the connection between the state of the cerebellum and the genital functions; the latter being much excited, and the penis in an almost constant state of erection. See "Case of Arachnitis Cerebelli, by Robley Dunglison, M.D., &c., &c.," in the "*London Medical Repository*," for October, 1822; and Abercrombie "*On Diseases of the Brain*," 3d edit., Lond. 1836, p. 60.

Farther and direct physiological proof of the connection is found in the recent experiments of Dr. Budge of Altenkirchen. The following are the views of this gentleman on the subject: —

"It is well known that Gall places the organ of the sexual appetite in the cerebellum; and the remarks of subsequent physicians have often been directed to the subject, though without having yet arrived at any definite result. For even if one collects all the known cases of diseases of the cerebellum, as Burdach has done, one finds, indeed, that an actual affection of the sexual organs has occurred in no small number of such cases, but that in a great number, nay, even in the majority, none such has existed. In like manner cases have occurred to every observant physician which are favourable to such a connection of the two organs; and, again, others which, though in other respects similar, afford no such evidence. A more certain and incontrovertible proof is wanted; and I have at length succeeded, by experiments on numerous animals, in demonstrating this influence of the one organ upon the other, in the most simple, distinct, and certain manner.

"For these experiments old cats are the best animals that can be employed; and they may be made upon them either during life, or, still better, immediately after death. The experiments were repeated so often, that there could not be the least doubt in regard to their result; and though, in some animals, the phenomena were far more marked and distinct than in others, yet in all they were so similar, that the relation of one will sufficiently illustrate the whole.

"In a twelve-year old male-cat, who had been killed by a wound

of his heart, the whole of the skull was removed as quickly as pos sible, and then the abdominal cavity opened, and both testes, with their spermatic cords and vasa deferentia, exposed; all of which occupied but a few minutes. Not the slightest motion was observed in the testicles. I now stimulated the cerebellum with the point of the knife; and I had done so for scarcely so much as three seconds, when one testicle raised itself up, and moved from the spermatic cord on which it had lain, so as to form nearly a right angle with it. At the same time it became more and more tense. The more I irritated the cerebellum, the more the testicle moved. I stimulated hither and thither, but the two testicles were never moved at the same time. I soon discovered the cause of this remarkable fact. When I stimulated the right lobes of the cerebellum, and the right half of the commissure, the left testicle always moved; when, on the other hand, I stimulated the left lobes, and the left half of the commissure, then as regularly the right testicle rose up. I had thus the movement of the testes entirely under my control, so that I could make one or other move as I wished; and I continued the experiment for full half an hour.

"The cerebellum is, then, the part at which the nerves of the testes have their terminal point; the nerves also cross each other in the brain as those of all the rest of the body do; and they must lie tolerably superficial in it, because a deep irritation does not succeed in producing the motion of the testes. It seems probable to me, that the union of the nerves takes place in the region of the first cervical vertebra, because stimulus of this part of the cord is very often accompanied by erection and discharge of semen, as in the hanged, &c.

"This simple observation is of the greatest importance in many physiological and pathological phenomenon. Thus, from this connection, the hitherto inexplicable sympathy between the testicles and parotid gland is accounted for by nervous communication. Perhaps also the relation of the testes to the growth of the beard is explained by this connection, since the trigeminus nerve may be traced in its ultimate roots to the part where the union of the nerves of the male sexual organs may be conceived to take place; and the nervous trigeminus is distributed in the face, and, most probably, contains organic fibres, which are concerned in the growth of the hair.

"It cannot be thought remarkable, that in so many diseases of the cerebellum, the sexual organs should still not suffer. For, in the first place, the whole cerebellum is certainly not to be regarded as the central point of the sexual nerves, but only a part of it; and if this part does not suffer, the sexual organs will remain healthy; and, in the second place, one would be wrong in thinking that every disease of the cerebellum must act in such a manner on those organs as to procure a distinctly observable disease. One may suppose that if the part where the nerves meet were compressed, impotence would probably result; but how many men are impotent without even knowing it." — *Müller's Archiv.*, Heft. v., 1840. — B.]

LECTURE LXXXIV.

Symptoms of Encephalitis — Conclusions as to contraction and paralysis — Remarkable cases of encephalitis — Abscesses in the brain — Sympathetic affections — Enteritis simulating cerebritis — Prognosis in cerebritis — Remote neuralgia a symptom.

To-day we again take up the subject of encephalitis; and allow me here to observe on the extraordinary variety and complication of the symptoms of this disease. Unless you study with extreme care a great number of separate cases of cerebral disease, you will never be able to get clear ideas on the nature of this affection, so peculiarly interesting to the pathologist and the practical physician. More circumstances seem to combine in creating a variety in the symptoms of cerebral affections than in those of any other viscus of the body. We have in the case of cerebral disease all the variety of symptoms depending on the peculiarity of the part engaged, on the complication of local encephalitis with arachnitis, on the results of pressure, the nature and extent of effusions, the difficulty created by the phenomena of neurosis, and many other circumstances.

At my two last lectures I drew your attention to some cases of local encephalitis, in which the disease was pointed out by certain affections of the muscular and generative systems. There are several other circumstances connected with this part of the subject, which are also deserving of attention, and it is necessary that you should be aware that there are other sources of diagnosis in cases of local encephalitis besides those already mentioned. There is no doubt, that, though in many cases the occurrence of contraction, spasms, and pain in the extremities, precedes that of paralysis, yet we may have paralysis from local cerebritis coming on *without these precursory signs*, and as suddenly as in cases of apoplectic effusion. This important fact you must never lose sight of.

Of this I have now seen several instances. I recollect a remarkable case of a man who had been bled in the cold stage of an ague, with the effect of stopping the intermittent. In a few days symptoms of pneumonia set in with great prostration of strength. These were followed by signs of disease of the brain, which were that the patient became suddenly nearly insensible, and on that day was observed to have his hand constantly placed on the right side of the head. Next day, without any preceding spasms or contractions being observed, he was found paralytic in the left upper and lower extremities, with paralysis of the left sterno-mastoid, and loss of sight in the left eye. On dissection we found softening of the two anterior thirds of the right hemisphere, which were of the consistence of thick cream. The disease engaged the corpus striatum, but the optic thalamus was healthy.

Another remarkable instance occurred lately in a person labour-

ing under aneurism of the innominata and hemiplegia. Here the paralysis came on suddenly, and its cause was found to be an abscess of the brain. I must observe, however, that there were some precursory signs in this case, though contraction and spasms were not observed. The patient had violent headache, and was subject for some time to occasional numbness and pain in the affected arm.

I repeat it; you may have the greatest variety in the succession and combinations of the symptoms of this disease, and this observation applies to the lesion of muscular motion, sensation, the state of the intelligence, and the organic functions. You must study numerous cases to get an accurate idea of this disease. I would advise you to examine the writings of Lallemand, Bouillaud, Abercrombie, and Serres, on this subject, and then consult the last edition of Andral's *Clinique Médicale*, where you will find the value of the symptoms discussed in a most impartial and philosophical manner. In this splendid work you will find many cases of cerebritis, in which the symptom of spasm and alternate flexions and extensions was wanting. Indeed he looks upon it as a symptom which cannot yet be called pathognomonic.

We may, I think, come to the following conclusions on this subject: —

1st. That local encephalitis is often accompanied by various forms of muscular contraction in the parts afterwards to be paralysed.

2d. That in some cases the paralysis is not preceded by muscular contraction, though various lesions of sensibility may occur.

3d. That the paralysis may be gradual (which is the most common case), or sudden.

4th. That the contraction may be intermittent, periods more or less elapsing when the symptom is absent.

5th. That in general the contractions occur in the first, the paralysis in the second stage.

6th. That in a few cases the reverse occurs.

7th. That in some cases general or partial convulsions, and in others tetanic symptoms, precede the paralysis.

You will see in the *Gazette Médicale*, for October, 1833, the particulars of a most interesting case, recorded by Bérard, jun., of fungous tumours of the dura mater, which was not accompanied by any alteration of muscular motion. This was removed with the adhering portion of the dura mater when the patient was attacked, for the first time, with loss of consciousness and convulsions of the trunk and extremities. The operator, justly concluding that the sudden removal of the partial resistance of the brain was the cause of the symptoms, applied a piece of agaric to the denuded surface, and made gentle pressure upon it, when he found that immediately the convulsions ceased, and the intelligence was restored. Thus, gentlemen, does disease often become a second nature, and its want is the cause of symptoms.

As far as we see of the brain, this pathological fact appears certain, that injuries of he upper part of that organ are accompanied by more marked and distressing symptoms than similar lesions of the lower part. There seems, indeed, to be a decided difference between the sensibility of the superior and inferior parts of the brain. The great proportion of those cases in which there was extensive latent disease of the brain, have been cases in which disease predominated in or towards the inferior surface of that organ. In this situation it has been proved by numerous examples that you may have extensive disease without those symptoms of muscular or mental derangement, which ordinarily characterize inflammatory affections of the brain. I recollect the case of a patient who was brought into our wards complaining of feverish symptoms, with pain of the left temple, extending to the eye of the same side. With the exception of this pain, he had no cerebral symptoms of any kind; his intellect was sound, and he was quite free from muscular pain, rigidity, spasms, or paralysis. He was ordered to take some opening medicine, and to have leeches applied over the seat of the pain, but derived no benefit whatever from the application. This led me to suspect that something unusual was going on, and more particularly when I observed that the leeches were repeated without any decided benefit. One morning on going into the ward I looked about for him for some time to no purpose; in fact, his countenance was so altered that I could no longer recognise him. During the night, the globe of the eye was almost suddenly thrust forward by an enormous œdema of the soft parts of the orbit, and the pain became excruciating. It was then conceived that the pain complained of on admission was the result of disease of the bones of the orbit, and that abscess had formed behind the eyeball. Under this impression, and in accordance with the earnest request of the poor sufferer, it was determined to make an incision to give exit to the confined pus. A curved bistoury was cautiously though deeply introduced over the eyeball, but on withdrawing it only a small quantity of serum escaped. The swelling went on increasing, and the eyeball was pushed forward so as to be raised above the level of the nose. A curved bistoury was then carried extensively round the orbit, but without giving exit to any matter. Under these circumstances, I came to the conclusion that it was an example of deep-seated abscess of the brain, with symptomatic œdema of the orbit. This œdema of superficial parts, in cases of deep-seated disease, is, you know, a thing of common occurrence, and may be observed in many instances of hepatic abscess, acute pleuritis, and other inflammations. In fact, there is such a remarkable sympathy between deep-seated parts and the integuments over them, that you may have this œdema in deep-seated inflammations of the organ. The patient now became gradually worse, his agony was intolerable, and the protrusion continued undiminished, but he had not either delirium or convulsions. He sank into a state of profound coma, in which he remained for about twenty-

four hours, when death put a period to his sufferings. On dissection, there was no pus found in the orbit, and its bones were healthy, but in the inferior part of the anterior lobe of the brain there was an abscess about the size of a large walnut, resting on the cerebral surface of the orbit. I have since learned from several of my friends that they have witnessed cases of the same description. It is an interesting disease, and one which you should be acquainted with. I think the existence of the following symptoms should lead you to suspect it. First, pain in the head, preceding the appearance of tumour of the orbit, and this pain not affecting the orbit itself; for observe in this case the pain was referred to the temple and not to the orbit. The next thing is the pain resisting ordinary treatment, and being followed by a sudden œdema of the parts within the orbit, and protrusions of the eyeball. These two circumstances, when occurring in conjunction, should, I think, lead you to suspect acute internal disease. Again, in those cases where abscess supervenes on caries of the internal table of the bones of the cranium, the affection is much more chronic than in this or similar instances of deep-seated abscess of the brain. With respect to this remarkable symptom of local inflammation of the brain, this external œdema, I shall relate the history of another case, as I am anxious to throw as much light as possible on this obscure subject. It may appear strange, that when a dense bony plate and an extremely strong membrane (besides other parts) intervene between the integuments and the seat of disease, that local œdema of external parts should take place as a consequence of internal inflammation. Strange however as it appears, it is true, and the intervention of the skull does not prevent it, as will be seen by the following case: —

A boy was admitted into the Meath Hospital, complaining of severe pain in the situation of the mastoid process. He was of a scrofulous habit, and had for a length of time a discharge of matter from both ears, with slight loss of hearing. Some time before his admission the discharge had been very copious, but on being exposed to cold it was diminished in quantity, and he immediately was attacked with severe pain behind one of his ears. When he came into the hospital he was screaming with agony, but had no delirium, and the muscular system was unaffected. But what was chiefly remarkable in this case was, that on the second day after admission, a distinct tumour formed in the upper portion of the neck, about an inch and a half behind the mastoid process. So distinct indeed was it, that it was generally believed that the disease was periostitis of the base of the skull, which had run on to suppuration. An incision was made over the tûmour, and the knife was carried down to the bone, but no matter could be discovered. The patient then became gradually worse, the pain was dreadful, but there was no convulsions. Shortly before death he had a few slight muscular twitches, with delirium, and died in great agony. During the whole course of the disease, the discharge from the ear had

continued, and was remarkable for its fetor. On examining the brain, we found neither abscess nor arachnitis. On slitting up the longitudinal sinus, a remarkable fetid odour was perceived, which increased as the incision was prolonged in the direction of the left lateral sinus. Here there was a quantity of extremely fetid matter, of an almost cheesy consistence, and mixed with blood; and a communication was discovered between it and the internal ear, the bones of which were carious, and its cavity filled with the same kind of pus. Here we have a curious example of œdema of the external parts depending on deep-seated disease.

I shall now relate the particulars of a case in which, although the symptoms of an affection of the brain were better marked than in the foregoing, still they were by no means so decided as one would have expected from the appearances revealed by dissection. A patient was brought into the Meath Hospital, with symptoms which were thought to be those which mark the ordinary form of delirium tremens. The man had been a great drunkard, but for some time back had given up the use of ardent spirits. He complained of severe and constant pain of the ear, which he stated to be of twelve weeks' standing, and that it was this which first induced him to give up drinking, as he found that it was always aggravated by the use of spirits. On admission, he appeared to labour under a highly excited state of the nervous system; he had general tremors, and was incapable of keeping up a connected conversation, though he could answer a few questions accurately. Here we observe a remarkable difference between this and the last case detailed, in which there was not the slightest evidence of any lesion of the intellectual powers. In the present case, the symptoms were pain, tremors, and incapability of supporting a rational conversation, but no decided constitutional symptoms. The pain, which had never abated since its commencement, became now violently exacerbated, he moaned frequently, and kept his hand constantly applied to the affected side of the head. To this last symptom I beg leave to direct your attention, as it is an exceedingly common one in cases of local inflammation of the brain. After a few days the mouth was drawn slightly towards the affected side, and it was found that the tongue was protruded in the opposite direction. Symptoms of fatuity now became more distinct, followed by coma, and the patient sank. During the whole course of the disease he had no spasms or paralysis of any of the limbs. On dissection, there was a circumscribed abscess found in the substance of the middle lobe of the brain. The abscess itself was encysted, but the substance of the brain round it was soft, particularly at its inferior part, where it was found to be connected with a carious state of the squamous portion of the temporal bone. There was a considerable degree of softening in that part of the brain which lay between the abscess and the corpus striatum. Here we have a case in which pain of the ear is chiefly complained of; but, in addition to this, it was observed that the patient

could not sustain a connected conversation, that there was some fatuity, that the mouth was drawn to one side, and that coma came on before death. Under such circumstances there could be less hesitation in pronouncing the disease to be an affection of the brain; and accordingly we find, on dissection, unequivocal marks of disease of the middle lobe, in addition to the caries of the temporal bone.

I might detail many cases of a similar kind, without being under any apprehension that I should be occupying your time to no purpose, for the recital of such cases is better calculated to convey information on this obscure subject than any lecture. I shall, however, content myself with one or two more. A man, addicted to the use of ardent spirits, was brought into the surgical wards of the Meath Hospital in a state bordering on coma. It was thought at first that he was labouring under typhus fever, and, under this impression, no particular attention was paid to the cerebral symptoms for the first day or two. At the end of this period, it was learned that he had fallen in going up stairs, while in a state of intoxication. His head was shaved, but no signs of wound or contusion discovered, though his friends persisted still in their statement that he had fallen while intoxicated and hurt his head. When admitted into my wards he appeared moribund; his pulse was imperceptible at the wrist, he had extreme coldness of the limbs, and a disposition to the formation of gangrenous spots about the ankles. He was in a state of stupor; but when roused answered questions tolerably well, and said that he had no pain in his head. The remarkable feature, however, in this case, was a great degree of muscular rigidity, affecting all the extremities. The fore-arm was flexed, and he had not the power of extending it. The penis was in a state of permanent semi-erection, but there were no seminal emissions. Here was a case in which, taking all circumstances into consideration, the cause of the disease seemed to be in the brain. He had been drunk, and was supposed to have got a fall while in that state; he was comatose, from which, however, he could be roused; and he had rigidity of the limbs, with erection of the penis. With this view I came to the determination of treating it as a case of general inflammation of the substance of the brain. I concluded that there was no arachnitis, from the fact of his answering correctly when roused, while I felt convinced that if there was not actual inflammation of the substance of the brain, there was at least very intense and general irritation. The treatment in this case was successful. After warming the extremities by wrapping them in flannel, and the use of artificial heat, the head was shaved, a large number of leeches applied, and an ice cap ordered to be worn constantly. The leeching was repeated, and he used the ice cap for four days. On the second day after this plan of treatment had been entered upon, there was some improvement, but on the following day the accuracy of our diagnosis of inflammation of the brain appeared, for the patient had violent

spasms of the right arm and leg. These however subsided, the coma, rigidity, and other symptoms also disappeared, and the patient slowly but perfectly recovered. In addition to the means of treatment already detailed, the patient's system was placed under the influence of mercury.

A question might arise as to the exact nature of this case. Was it a case of actual inflammation of the substance of the brain, or was it mere sympathetic irritation produced by some other disease? It may be said that it was a case of gastro-enteritis, with a sympathetic affection of the head. It certainly might be so, but the great probability is, that it was not; because such symptoms as were exhibited in this instance are very rarely the result of gastro-enteritis; and if it was a gastro-enteritis it is not likely that such complete success should have followed treatment directed to the head. These circumstances make it likely that it was general irritation or inflammation of the substance of the brain itself; and, if so, the case strongly illustrates the utility of mercury, leeching, and cold applications in reduction of encephalitis. The man was brought into the hospital in a dying state, and recovered under the influence of physiological treatment.

While I am on this part of the subject, namely, the possibility of the head being sympathetically engaged in some instances to a very remarkable degree, I may say that the following conclusions on this point seem to be fairly drawn: — That when an affection of this kind depends upon a gastro-enteritis, the signs of cerebral irritation are *general* rather than *local*. In children who are labouring under apparent symptoms of cerebral affection, it has been long known that the irritation of the brain may depend on a variety of causes. In adults, too, the symptoms of cerebral irritation may be the result of various affections, of gastro-enteritis, worms in the intestinal canal, hysteria, hypochondriasis, and many other diseases. In most of these cases, however, particularly with respect to children, the symptoms are general, being pain, delirium, coma, and convulsions on both sides. But we very seldom witness the occurrence of symptoms of local irritation of the brain as produced by sympathy with some other disease, though it is a fact that they may occur occasionally, and without our being able, after death, to discover any existing local encephalitis. A young female was admitted into one of the surgical wards of the Meath Hospital for some injury of a trivial nature. While in hospital she got feverish symptoms, which were treated with purgatives, consisting of calomel, jalap, and the *black bottle*, a remedy which deserves the name of the *coffin bottle*, perhaps better than the pectoral mixture so liberally dealt out in our dispensaries as a cure for all cases of pulmonary disease. She was violently purged, the symptoms of fever subsided, and she was discharged. A few days afterwards her mother applied to have her readmitted, and she was brought in again and placed in one of the medical wards. Her state on admission was as follows: — She had fever, pain in the head, violent contraction

of the fingers, and alternate contractions and flexions of the wrist and forearm. These muscular spasms were so great that the strongest man could scarcely control the motions of the left forearm. In addition to these symptoms, she had slight thirst, some diarrhœa, *but no abdominal tenderness.* On this occasion a double plan of treatment was pursued; the therapeutic means being directed to the head in consequence of the marked symptoms of local disease of the brain, and to the belly, from the circumstances of abdominal derangement observed in this and in her former illness. She died shortly after with violent spasms of the hand and forearm; and as she had presented all the ordinary symptoms of a local inflammation of the opposite side of the brain, we naturally looked there first for the seat of the disease. After a careful examination, however, no perceptible trace of disease could be found in the substance of the brain, which appeared all throughout remarkably healthy. She had all the symptoms which, according to Serres and Foville, would indicate disease of the optic thalamus, or the posterior lobe of the opposite side, yet we could not find any lesion whatever of its substance after the most careful examination. But on opening the abdomen we found evident marks of disease; *the lower third of the ileum, for the length of six or eight inches, was one unbroken sheet of recent ulcerations.* This case I look upon as a very singular one, showing that we may have well-marked symptoms of a *local* irritation of the brain depending on a sympathetic cause. It is fortunate, however, for the study of medicine, that such cases form the exception and not the rule. I may remark here on the latency of the enteritis as to the pain. There was no abdominal tenderness, a fact illustrative of the great law which so particularly applies to gastro-enteric disease, *that when the sympathetic affections are prominent, the usual or local symptoms are proportionally latent.*

With respect to the prognosis in cases of local encephalitis, the following conclusions seem to be well grounded: — As a general rule, the prognosis is to be unfavourable, from the nature of the organ, its importance to life, and the frequent complicated and obscure nature of cerebral affections. In local encephalitis you have always two things to apprehend — the acuteness of the disease, and its subsequent effects. The patient may die of acute inflammation, or, if you control this, of the chronic disorganization which frequently supervenes, terminating in apoplexy, paralysis, and other consequences. On the other hand, it is consolatory to reflect that experience has proved the possibility of curing both general and local inflammation of the brain. There are numerous cases on record in proof of the success of well directed treatment. The annals of surgical science are filled with cases of extensive injury of the brain successfully treated; and it is equally true, that medicine can exhibit many instances of well-marked idiopathic inflammation of the brain brought to a favourable termination. In making our prognosis on a case of local encephalitis, much will depend

upon the extent to which the muscular system is affected. Spasm of one extremity is more favourable than spasm of both; and an affection of the muscles of the face is not so unfavourable as of those of the extremities. The next thing to be considered is the age of the patient. In the very young, and in persons advanced in life, our prognosis is not to be so good as in the case of one removed from these extremes, as neither of the former admit of such active treatment; but of the two, it is better to have to manage the disease in a child. It is also singular how well children will often bear active treatment.

There is another point which should not be omitted. There are, in some cases of local inflammation of the brain, muscular contractions and extensions, alternating with a state of rigidity, while in other cases the rigidity is permanent. It is not easy to say which of these cases is the worst, but I believe that the most unfavourable are those in which we have chiefly violent contractions and extensions. Again: with respect to the cessation of the spasms, it may be considered, either as a favourable or a most unfavourable symptom. The circumstance of the cessation of the spasms must have been produced by some modification in the state of the cerebral affection. If it be accompanied by a return of the power of transmitting proper motion to the affected limb, it is then a sign of great value, as showing that the cerebral irritation is nearly gone. But if the spasms subside, in consequence of the supervention *of resolution and paralysis*, then the cessation is a symptom of a most unfavourable kind, as showing that actual disorganization has taken place, which seems to be incurable.

It may be necessary to remind you that if the patient has, combined with these spasms, alternations of delirium and coma, it affords grounds for making a bad prognosis, as such symptoms indicate that the inflammation has extended to the periphery of the brain, and the arachnoid membrane. The state of the intellect is also a matter of importance; the more intact and undisturbed it is, the greater is the chance that the affection of the brain is confined within a small compass. Here, however, I am anxious to impress this upon your minds, that the absence of delirium should not mislead you, or induce you to form any favourable conclusions on that account alone, in cases of encephalitis, for it is a fact that we may have extensive and fatal disease of the substance of the brain without delirium. I need not tell you that convulsions, or paralysis of one side, do not indicate so unfavourable a prognosis as where both sides are engaged. Lastly, you should bear in mind that cases of inflammation of the substance of the brain are very subject to relapse. All these circumstances should be taken into account, and a favourable prognosis should be always formed with a great deal of caution.

I alluded in a late lecture to the occurrence of pain in some particular part of the extremities, as a premonitory sign of this disease. A remarkable case, bearing on this point, has come to my know-

ledge, and I think I cannot better employ the remaining part of our time than in giving a brief abstract of it. A lady got a pain in the lower part of the tendo-Achillis, which was considered to be rheumatic, and very little notice taken of it. There was no swelling, heat, or tenderness on pressure, in the painful part, and the nature of the disease was so imperfectly understood that all the efforts of her medical attendants were directed to the heel, but without any benefit whatever. Matters remained in this state for some time, when she was suddenly attacked with convulsions and coma, and died. On opening the head some hours after her demise, a large abscess, together with an apoplectic effusion, was found to exist in the opposite hemisphere of the brain. There are various other examples of a similar kind. I have no doubt that many of those anomalous pains are frequently connected with incipient disease of the brain. I know the case of a gentleman, labouring under a painful affection of the face, which had got the name of tic douloureux, and had been subjected to all the variety of treatment which persons labouring under that affection so commonly undergo. But it has since been proved that his complaint is by no means analogous to what has been termed tic douloureux, for it has been most successfully treated by shaving the head, and applying leeches and an iced cap over the seat of the suspected irritation. At present, whenever an attack comes on, he immediately gets a bladder, containing a quantity of pounded ice, applies it to his head, and in this way obtains relief. This shows that the severe pain in his case, which many would confound with a local affection of the nerves of the face, is decidedly the result of a morbid sensibility of the cerebro-spinal centre.

LECTURE LXXXV.

Encephalitis—Treatment of, in the adult—Importance of energetic means—Dangerous effects of opening the temporal artery or jugular vein—Copious bloodletting from the arm—Difficulty of producing syncope—Employment of cold—Good effects from purgatives—Encephalitis caused by piles—Treatment—Beneficial effects of blisters—Mercury—Dangerous effects of emetics—Dessault's treatment—Use of opium—Violent counter-irritation of coma—Application of boiling water—Treatment of partial encephalitis.

We have now to enter upon the treatment of inflammation of the brain; and you will find that a knowledge of the general principles of the treatment of cerebral inflammation will be quite sufficient to guide you, even in the management of cases which present apparent exceptions to the ordinary symptoms. The truth is, that the principles which should regulate the treatment of inflammation of the brain are nearly the same in all cases.

I shall commence with the treatment of the acute form in the adult. Acute phrenitis in the adult is an exceedingly severe disease, characterized in its first period by an high exaltation of the

functions of the brain, and in its second by a corresponding depression. In this form of disease we have generally high fever, a strong, bounding pulse, throbbing of the carotids, intense pain of the head, great brilliancy of the eye, with intolerance of light, vivid redness of the face, a ferocious countenance, and furious delirium. Under such circumstances there is no time to be lost; the brain is a delicate organ, and cannot bear much disease, and its powers of recovering from idiopathic disorganization seem much less than those of the lungs or abdominal viscera. Indeed, we must believe that, notwithstanding the assertions of Lallemand, it remains to be proved that recovery can take place after the stage of softening has set in, in idiopathic encephalitis. The brain differs from the lungs or digestive organs in having no excretory duct for the products of inflammation, and hence one cause of the greater danger of its idiopathic inflammations than its traumatic, where an opening is formed in the skull. In such a case you have to apprehend two pathological lesions, the inflammatory softening of the substance of the brain, and the inflammation of its serous membranes, with effusion into their cavities. The patient, too, may die from congestion, or even an apoplectic effusion may occur, illustrative of the proposition of Broussais, that all encephalic irritations may produce an apoplexy. I have seen this termination, even in the infant under a year old; in such a case I once saw an apoplectic effusion which had supervened in the course of an arachno-cerebritis, and which amounted to several ounces of blood. Every moment is precious, and no consideration should induce you to put off, even for an hour, the adoption of the most rigorous measures. In the first place, you must bleed; and here let me remark that bloodletting should be performed so as to make a decided impression on the symptoms. It will often happen, that, from the state of uncontrollable fury which the patient is in, it is dangerous and almost impossible to bleed him. Here you must endeavour to moderate the delirium, and there is no way by which you can accomplish your purpose so fully as by cold dashing. Where there is high delirium, I believe you will always find it the best plan to precede venesection by throwing a few basins of cold water over your patient's head. This will procure an interval of comparative tranquillity, during which you can open either a vein or an artery with convenience and safety. Of course, if anything like collapse ensues (which is possible) you will not bleed immediately. The object of the cold pouring, under these circumstances, is to obtain such a diminution of the fury as will allow of your bleeding the patient with safety, as to the operation. If you cannot reduce the cerebral excitement by this means, it will then be necessary to put on the strait waistcoat, *pro tempore*. There is a difference of opinion among medical men with respect to the mode of abstracting blood; some prefer taking it from the arm, some from the jugular vein, and some from the temporal artery. Now, I am inclined to think that it is better to open a vein in the arm, and that venesection performed in this

way will be found to answer every purpose. It is said that if you take blood from the temporal artery or jugular vein, you deplete the brain more directly than you would by opening one of the brachial veins. This may be true, though I think it still remains to be proved that the drawing of a smaller quantity of blood from these vessels will have a more powerful effect on the system than from the arm. If you open the temporal artery, there are two disagreeable circumstances which you should be prepared to meet. In the first place, the patient is in a state of furious delirium, you don't know how long this may last, and it may happen that in one of his paroxysms he will tear off the bandage, and, if not watched, bleed to death. A case of this kind occurred not long since in the person of a gentleman of this city, who had the temporal artery opened. He tore off the bandage, and a terrible hemorrhage ensued; assistance was procured, and the bandage readjusted; he tore it off a second time, and died shortly after; his death being evidently accelerated if not actually caused by the quantity of blood lost. Again, it is possible that an aneurism may be formed as a consequence of the operation, which may excite a determination to the head, and tend to keep the patient in a state of excitement. Thirdly, you must employ a bandage to secure the artery, and to this there is a strong objection, in consequence of the pressure which it makes on the external vessels of the head. I am, therefore, strongly opposed to opening the temporal artery in cases of acute inflammation of the brain, accompanied by high mental or muscular excitement. Now, with respect to the jugular vein, you are aware that to command this vessel pressure is also required. How this pressure can be made without interfering with respiration and compressing the veins of the neck, so as to add to the existing congestion of the head, I am at a loss to know. I would advise you, therefore, when you bleed in phrenitis, to prefer opening a vein in the arm; by making a free incision you can draw blood in such a way as to make an impression on the system, fully equal to that produced by either of the foregoing modes; and without subjecting your patient to the same degree of inconvenience or risk. The quantity of blood to be taken away must be regulated by the age, strength, and constitution of the patient, as also by the intensity of the disease. Where you have to deal with a young man of robust constitution, your first bleeding may amount to thirty ounces. You will often find it difficult to produce fainting in this disease, for the excited condition of the brain keeps up a constant determination to that organ, and prevents syncope. The same dfficulty is met with in cases of hypertrophy of the left ventricle, which causes a great determination to the head.

Your next step is to have the head shaved. Never omit this. The very circumstance of freeing the head from the covering of hair, and permitting the free contact of air with the scalp is of advantage; and if you wish to employ cold applications, you cannot do so properly without premising this operation. After you

have done this, you should apply a large number of leeches to the scalp, or if you cannot readily procure leeches, employ instead of them light scarifications to the temples and nape of the neck, and keep on the cupping-glasses until you have obtained a sufficient quantity of blood. By acting in this way with promptness and decision, you arrest the violent symptoms and gain time.

In treating a case of this kind it is a very common practice to use cold applications. They are for the most part applied in shape of a cold lotion to the head, but I need not tell you that this is a very imperfect mode of using them; and indeed I have seen but very few persons who were acquainted with the proper mode. Persons are in the habit of supposing that the mixture of a certain quantity of saline ingredients with water should produce a very cold lotion, and so it does indeed while the salts are dissolving; but as soon as this is accomplished, the mixture rapidly acquires the temperature of the surrounding air. The solution is generally prepared by the apothecary, (and sent in a bottle, as if they could cork up the cold,) but the cold is quickly lost, and, in a few moments after the lotion has been applied, you will find it tepid, and passing into a state of vapour. Now, if you wish to derive any benefit from the use of cold applications, you must stand by yourself, and see the thing properly done. The object is to have the scalp kept constantly cold, and this can be done only by the repeated application of cold lotions. If you prefer saline lotions, you should have them made by the bedside, and applied *while in the act of solution*, or you should put a quantity of ice into your lotion, for while a single piece of the ice remains undissolved, the temperature of the lotion will be very little above the freezing point. A very good way is to have a jar of cold water with a quantity of ice in it, and to apply clothes dipped in it every minute, taking care not to immerse the hot cloth into the iced water until it has been wrung out in another vessel of water. You may also use the ice cap, though this is a painful remedy. But the mode of using ice to the head, which I prefer in all cases, and particularly in that of the child, is to take a piece of smooth ice, about the size of a dollar, and half an inch thick; this is to be placed in the hollow of a fine cup sponge, and steadily moved over the whole shaved scalp. By this mode you prevent the pain which the iced cap produces, and the sponge absorbs the water produced by melting, and the application may be continued for an indefinite length of time. But one of the best modes of applying cold to the head is that recommended by Dr. Abercrombie, and, as far as my experience goes, I can safely affirm that there is scarcely any remedy of such unequivocal value in acute inflammation of the brain or its membranes. Dr. Abercrombie's mode is this — the scalp being first shaved, you direct the patient's head to be held over a basin, and then taking a jug of cold water, pour its contents over the head from some height in a small continuous stream. This measure, simple as it may appear, is one of extraordinary efficacy. In fact, so great and instanta-

neous is the depression of the vital power produced by this mode, that it must be used with caution. There are numerous cases of persons in the highest state of maniacal excitement, reduced in a few moments to a low and weak state by this powerful remedy. There are also instances of its rapidly depressing effect in the early stages of acute hydrocephalus. I have used it more in the phrenitis of adults than in the hydrocephalus of children; but in the latter disease I know many instances of its value, and believe it to be only secondary to the application of leeches. In acute inflammation this form of cold affusion should be employed every hour or half hour, according to circumstances, and if you wish to increase its efficacy you can do it by placing the patient's feet in warm water at the time of its application. Here, then, gentlemen, is the first set of remedies you should employ in a case of acute phrenitis; a full bleeding from the arm, premising it, if there be great maniacal excitement, by dashing a basin of water over the patient's head; shaving the head, and applying a large number of leeches, or if these are not within reach, the use of cupping; and, lastly, the constant application of cold lotions, or the use of the cold affusion after the manner employed by Dr. Abercrombie. These are the great measures which should be boldly and promptly put in practice, in order to counteract the first violence of a case of acute inflammation of the brain,

You will next act upon the bowels by purgatives. This is a matter of the deepest importance, for there is hardly a disease in which the judicious administration of purgatives has been followed by more decidedly beneficial effects, than in inflammation of the brain, where the digestive tube has been in a healthy condition. Purgatives are also found to be of great benefit in the simple hydrocephalus of children, and in several cases it has been observed that the disease did not yield even after active bleeding, until purgation had been employed. Dr. Abercrombie speaks in the highest terms of the value of purgatives, even after coma has set in. The purgatives which are generally used are those of the drastic kind, and they may be given by the mouth, or in the form of enemata.

Such are the rules for the treatment of the ordinary form of acute encephalitis. I shall now make a few observations with respect to the local applications. It may not be necessary to repeat the venesection, particularly if the means which I have recommended be put in practice in a regular and proper manner; but it will in most cases be requisite to repeat the leeching. *Even in the advanced stage of the disease, and after coma has made its appearance, Dr. Abercrombie lays great stress on the benefits derived from the application of leeches;* and I think I have myself saved some lives by the employment of leeches, even after the supervention of coma. In all violent cases I would recommend strongly to you the using relays of leeches from the first, to keep up a continual detraction of blood. In addition to this, the patient must be kept perfectly quiet,

all loud sounds, and the stimulus of light avoided; the room should be kept cool and well-aired, the bed-covering light, the attendants few, and the nurse should be a person of cool temper and steady disposition.

These are the principal measures to be employed in the treatment of acute inflammation of the brain in the adult; there are certain cases, however, in which you may add to these measures others of a different kind, particularly in cases where the disease has occurred as a consequence of the metastasis of inflammation from other parts. Suppose you have a case of rheumatism, or of some suppressed evacuation in which there is a metastasis to the brain. Under such circumstances, while you employ the means I have mentioned for the purpose of subduing cerebral inflammation, you will also put in practice the best measures for restoring the original disease. Here, however, you should bear in mind, *that your attempts to bring back the original disease are always to be looked upon as secondary to those for the direct removal of the existing irritation of the brain.* Some practitioners, in such cases, content themselves with endeavouring to restore the original affection, but this is playing a dangerous game. An organ of vast importance to life is affected, and you cannot calculate how far the inflammation may proceed. You should never neglect taking proper steps at first to reduce inflammation, while at the same time you need not neglect the means calculated to bring back the former disease. If the encephalitis be caused by the suppression of bleeding piles, or a sudden checking of the menstrual flux, leeches to the anus or vulva are found useful along with the direct treatment. If the disease be produced by the repression of an exanthematous eruption, the same principles apply. You should never omit employing the means for bringing back the original affection, but you should always recollect that they are to be secondary to the measures adopted to directly relieve the cerebral excitement.

With respect to the use of blisters, the same rules apply here as in other cases of disease treated of during the course. They are never to be used in the early stage of the disease, and while active inflammation is present; and, as a general rule, I believe it is better to apply them to the nape of the neck, or the inside of the legs, than directly to the head. There is only one case in which you can apply them with advantage to the head itself, and this is where there is coma with a cool skin. Here the stimulus of a blister is frequently found to be highly useful.

As to the use of mercury in cases of acute cerebral inflammation, I think we have not as yet a sufficient number of facts on which to form any decided opinion. If we look to hydrocephalus, we shall find that there are many cases in which the symptoms did not yield to the ordinary measures until mercury was employed; this, however, we do not find to be so much the case in the acute inflammation of the brain in the adult. I shall return to this subject on a future occasion.

I have little doubt that emetics are very dangerous in this disease, from the determination to the head which they produce.

Any of you, gentlemen, who has vomited, cannot forget the violent sense of tension about the head with which the act is accompanied; and, if the brain be in a state of acute inflammation, you can readily conceive how injurious such an effect must be. The use of emetics in this disease has been adopted in consequence of a misconception of the opinions of Dessault. He attributed extraordinary efficacy to the use of tartar emetic, in cases of injuries of the head. But you must be aware that Dessault did not give tartar emetic so much with the view of exciting emesis, *as of producing a degree of nausea calculated to keep down inflammatory action.* Moral, who was a pupil of his for five years, makes a statement to this effect, and says that so far from proving beneficial when it vomited, the tartar emetic was always attended with unfavourable results. When it acted on the skin, or by stool, he says the effects were favourable; but when it vomited, the symptoms of cerebral excitement were always increased. Under these circumstances, I think you should be cautious in having recourse to the use even of tartar emetic, after the manner of Dessault; for even in this way you run the risk of vomiting. On this point we have eight very instructive cases given by Lallemand. In the first two cases, where emetics were used, the head had been merely threatened. The emetics were followed by profuse vomiting, and this by symptoms of *violent cerebral excitement and rapid death.* The third case was that of a patient who had apoplexy: the emetic was followed by symptoms of inflammation of the brain and death. On dissection, there were marks of inflammation discovered round the clot. Now it has been observed, in several instances, that where the substance of the brain round an apoplectic clot became inflamed, that, in addition to the phenomena of apoplexy, symptoms of a spasmodic affection of the muscular system supervened. Here we see, that after the use of an emetic these symptoms appeared, and their nature was verified by dissection. In the remaining five cases, where emetics were employed, the cerebral affection was rather increased than diminished; and, in some of them, disease of the digestive tube was superadded. Weighing these circumstances calmly, I think the use of emetics in acute inflammation of the brain may be considered dangerous.

With respect to opium, I must say that I am strongly opposed to its employment, at least in the early stage of encephalitis. I have seen many cases of hydrocephalus in children, in which opium seemed to be decidedly injurious; and I believe that in all cases where there is congestion of the brain, its employment will be attended by bad effects. But when all the symptoms of active inflammation have passed away, and when there remains a peculiar nervous condition of the brain, characterized by symptoms of mental excitement and persistent watchfulness, somewhat resembling dilirium tremens, here, I believe, that you may have recourse to

opium with much benefit. In many cases where the antiphlogistic treatment had been properly employed at the commencement, there frequently remains a neurotic condition of the brain, accompanied by great irritation and absence of sleep; and in such cases I have seen much good resulting from the use of opiates. When I speak of fever I shall return to this subject.

In the treatment of this disease, I am anxious that you should always bear this principle in mind — that you cannot be too cautious in adopting means of coercion. Coercion has always a bad effect: it should never be resorted to, except in cases of extreme necessity; and you should never suffer the patient's attendants to employ it without your express permission. It is a common practice in hospitals, where the attendants always wish to save trouble, to put on the strait waistcoat as soon as the patient exhibits symptoms of delirium. What is generally the result of this treatment? The poor sufferer becomes irritated by confinement, and uses the most violent efforts to liberate himself; his struggles increase the excitement of the brain, and prevent the measures you employ from taking effect. I have known many melancholy cases, illustrative of the abuse of the strait waistcoat. I shall give you one: — A female, of delicate habit, was attacked with fever and some delirium. She was supposed to labour under disease of the brain. They put a strait waistcoat on her, and tied her down to the bed, where she remained for several days in a most deplorable state. A medical man, who was called in to see her at this time, found her in the situation described, with her head shaved and blistered, and her strength sinking. It struck him that there was something peculiar in the case, and he asked her several questions with the view of testing her sanity; and, finding that she answered rationally, he immediately directed that the strait waistcoat should be taken off. She then told him that, during the whole course of her illness, she had laboured under pain of the right side. He examined her side, *and found a large tumour in the situation of the liver.* There was also an eschar on the back. She died shortly afterwards; and, on dissection, the liver was found to be in a state of extensive suppurative disease; the brain perfectly healthy. It is unnecessary for me to make any comment on this case.

While, however, I deprecate coercion as a common mode of proceeding, I fully admit that cases will occur that demand it for the safety of the patient. The dreadful tendency to suicide is one of the characters of this disease, and must never be forgotten in any case. All that I wish to impress upon you is, that coercion must be used with great caution, and only so long as it is absolutely necessary. When we come to treat of the nervous system in fever, I shall recur to this subject.

In all cases of cerebral disease you should never omit inquiring into the state of the bladder, for there is often retention of urine. This is to be obviated by drawing off the urine with a catheter, two or three times a day.

You will meet with cases of cerebral inflammation in the last stage, with profound coma, general paralysis, an imperceptible pulse, and tracheal rattle. It is a melancholy thing to be called to a case of this description, where the ordinary means furnished by medicine are so inadequate to the removal, or even the alleviation of symptoms; and yet it is a fact that, even under these circumstances, cases have been cured by the adoption of an extraordinary measure. This consists in the employment of enormous and sudden counter-irritation, by pouring boiling water over the lower extremities, while, at the same time, ice is applied to the head. This is certainly an extraordinary and barbarous method; but it has succeeded in rescuing the patient, as it were, from the jaws of death. One of the most singular cases of this kind is recorded by Lallemand — that of a man upwards of sixty, who, in consequence of a fall on the head, was attacked with encephalitis, which was mistaken for an essential fever until the tenth day. At this time he was first seen by Lallemand, who found him labouring under severe and long-continued syncope; the right extremities flexed; the hand firmly closed; the surface on this side insensible; the eyelids closed; the eyes turned up, squinting, and insensible to light; complete loss of hearing and intelligence. The body was covered with a cold viscid sweat; the respiration frequent and stertorous, and the pulse absent. Lallemand proposed pouring boiling water on the ankles, and, at the same time, applying ice to the head, an advice which was consented to with great reluctance by the other medical attendants. At the moment the boiling water was applied, there was a sudden motion of the whole body; the left arm was agitated, the eyes opened, and the pulse could be felt at the wrist. In half an hour the boiling water was applied to the thighs with still greater effect; colour returned to the face, and the pulse became fuller. From this time improvement went on. Deep suppurating wounds were produced by the boiling water which took more than six weeks to cicatrise. The patient's recovery was perfect.

In Dr. Mackintosh's work you will find this practice recommended. It is indeed an extreme remedy, and one which, for many reasons, practitioners would have repugnance to use; but it is well to be acquainted with such a powerful remedy, and to know that it has succeeded under the most desperate circumstances.

With respect to partial encephalitis, the principles of treatment are the same. In this form of disease you will often have to contend with the prejudices of the patient, and sometimes of practitioners who do not recognise its existence. Its symptoms, you will remember, may at first appear slight or insidious, and to the superficial observer less referrible to the head than elsewhere; yet the disease is full of danger, slight though it appear. The recent researches on this subject have shown, too, that it is commonly a comparatively acute disease. Andral gives a table, showing the

periods in one hundred and five cases: in eighty-nine of them death occurred within a month. The liability, too, of secondary complication, with general congestion, arachnitis, or apoplexy, must be always borne in mind.

When the symptoms of a local encephalitis are decided, I think you should always commence by bleeding from the arm, and then apply relays of leeches and cold lotions to the opposite side of the head. You will also find the application of tartar emetic ointment, so as to bring out an eruption as soon as possible, of great value in cases of this kind. Above all things, take care to relieve the symptoms by prompt and decided measures before the stage of paralysis comes on; for when this arrives, I believe you can do very little in the way of cure. I have seen three cases in which, after the depletions, the symptoms was relieved by bringing the patients rapidly under the use of mercury; and I think local inflammation of the brain may be treated by mercury as well as localised inflammation of other parts. My late lamented friend, Dr. Leahy, communicated to me the particulars of two cases in which pain, spasms, and other symptoms of a local encephalitis were present, and in which complete relief was obtained as soon as mercurial action was brought on. I recollect an old lady who got pain in the right side of the head, with contraction of the finger of the left hand, and alternate flexions and contractions of the forearm, accompanied by slight lesion of the intellectual functions. She was leeched three or four times, blistered, and purged, without any decided relief. I then determined to try the effect of calomel, and was gratified to find that, according as her mouth became affected, the pain and contraction of the fingers, as well as the motions of the forearm, diminished considerably, and as soon as full ptyalism was established all her symptoms disappeared. This case is particularly interesting, inasmuch as it shows that the ordinary treatment by leeching, counter-irritation, and purging, failed in giving relief, so that we are justified in attributing some value to the use of mercury. In the advanced stages of this disease, it seems right to employ a seton in the back of the neck; and I would advise all who have been attacked to continue the use of this remedy for a great length of time.

The term *ramollissement*, or softening of the brain, is one which is very extensively used, and I fear often without any precise idea of its meaning. In ninety-nine cases out of a hundred this ramollissement will be found to depend upon local inflammation of the brain; of this I do not entertain the slightest doubt. I think we may very safely consider it as analogous to the softening of the lungs, liver, or spleen, or from inflammation of their texture. There is a peculiar softening of the brain in old persons, which we cannot connect with actual inflammation, but in all cases in the child, and in almost every case in the adult, ramollissement of the brain will be found to depend on inflammation. I do not mean to infer from this that it is in our power to cure every case of softening of the brain,

for when it once sets in, the great probability is that the texture of the affected part is destroyed; but we can cure many cases by subduing the inflammation from which it derives its origin. Of course we cannot expect to accomplish this in the case of old persons, where the symptoms come on without any inflammatory phenomena, as in that peculiar softening of the brain which forms the subject of Rostan's work, and occurs in persons beyond the age of seventy. This appears to be a species of senile gangrene. That form of ramollissement, which occurs in adults and children is, however, very different from this, being, in the vast majority of cases, the result of inflammation. You will hardly ever dissect a case of partial encephalitis in the adult, or of hydrocephalus in the child, without finding more or less of this inflammatory softening.

[As the remarks of Dr. Stokes, in this and a subsequent lecture, on *ramollissement* or softening of the brain, are more allusive than explanatory, I subjoin a few additional particulars.

A Diminished Consistence or Softening of the Brain, *Encephalomalacia*, is found in various fevers, in rickets and tubercular disease of man and animals, in consumption of the lungs and diabetes, and in mental diseases, but especially in dropsy of the brain. More generally, however, and also more distinctly, the softening is of certain parts only of the brain, either in consequence of inflammation, or as an effect of a peculiar process of conversion. Rostan, (*Traité Elementaire de Diagnostic, de Prognosis, &c.*, Tome II., p. 279,) says that softening or *ramollissement*, as he terms it, of the cerebral or pulp, results from inflammation, 1, when the colour of the altered part is rosy; 2, when it contains a certain quantity of pus; 3, when febrile phenomena have been observed during life.

Softening of the brain has not an inflammatory character, according to the same authority, 1, when the colour of the altered part is whiter than natural, and when this whiteness cannot be attributed to an intimate mixture of pus with the cerebral substance, which is quite common; 2, when the sanguineous injection is displayed by a number of points, or even by true ecchymoses in the diseased part: in these two cases the softening may be the effect of an abortive hemorrhagic effort which merely produced irritation, such as, for example, that which gives rise in other organs to a scorbutic disposition; 3, when, during life, there was no febrile symptoms which could induce a suspicion of the existence of any irritation; but, on the contrary, all the phenomena were evident, which would point out an undoubted scorbutic or hypothenic state. The last or the non-inflammatory variety is much more common than the other in old persons.

The local symptoms of functional disturbance, or the derangements of cerebral function, are the same in both varieties; but it is not so with the general symptoms. The immediate functional phenomena are divisible into two periods. In the first, there is

generally pain of the head, vertigo, and a weakness of the intellectual and moral faculties, drowsiness, formication, pricking sensation and numbness in one limb; together with a difficulty in taking hold of objects, particularly if they are of small size. The sensibility is usually diminished; and vision is disturbed, being less accurate than common, and sometimes there is entire blindness; so also with the hearing, which is impaired.

If the softening is inflammatory this first period is shorter, and is marked by greater intensity of the symptoms; more acute pain of the head; abruptness of reply; and often delirium. The sensibility of the limbs is frequently great; the patient complains of pains in them, more or less violent; they are sometimes stiff and contracted: the senses are very irritable, and unable to bear their appropriate stimuli. The functions of organic life present nothing characteristic; the disturbances of function in it being met with in other diseases. The pulse, we are told, is softer, slower, and weaker than natural in the non-inflammatory variety; but in the inflammatory it is strong and frequent, with hot skin and great thirst.

In the *second* period the patient loses the use of a limb, or even of one side of his body, suddenly or gradually, but for the most part suddenly. In general, the intellect is not impaired; although the patient is very slow of speech, and only succeeds in making himself understood by painful gestures. Sometimes there is complete coma. If the coma and paralysis have come on suddenly, the patient usually recovers his consciousness on the day after the seizure. This is explained by the complication of cerebral congestion with softening of the brain. The symptoms soon return, however, with increased violence; the intellect and the functions of the senses are entirely destroyed, complete coma supervenes; the limbs become immoveable, and death closes the scene.

In the inflammatory softening, in place of paralysis, there are pains darting through the limbs, contraction, convulsions, and more or less intense cephalalgia. In both varieties of the disease, when there is headache, if we ask the patient where is the seat of his pain, he raises slowly his sound hand to the head, and commonly points out the side of it opposite to that paralysed.

In this second period the changes in the nutritive functions, or organic life, are of a marked nature. There is loss of appetite; we see the teeth dry, the tongue rugous, chapped, brown, and even black, deglutition painful, and finally impossible. Sometimes there is vomiting of alimentary matters, and then of bile, with an involuntary excretion of urine and feces; often there is constipation; the breathing is laborious, and towards the end stertorous; the pulse is weak, often irregular and intermittent; the skin is cold.

The *organic changes* in the brain noticed after death vary in consistence, colour, seat, extent, and number. The membranes are almost always infiltrated with serosity, and exhibit a gelatinous aspect. The effusion here, as on other occasions, must be regarded as consecutive on the softening, but it is not the less a contributing

cause of the comatose symptoms seen towards the termination of the disease. When the softening has been inflammatory, the membranes are sometimes dry, red, and injected; in some cases they are covered with suppuration, and adhere to the softened cerebral portion. The consistence of the brain varies from that of thin mush to the natural firmness of the organ. When the softness is inconsiderable, there must be a change of colour in order to enable us to recognise it. This colour is rosy, red, yellow, greenish, according to the degree of inflammation; it is of the colour of wine-lees in scorbutic ecchymoses and in abortive hemorrhagic effort; and is finally of a pure milk-white in those subjects in which there had not been, during life, any inflammatory symptom.

The softening may be either superficial or deep-seated. If the first, the convolutions are deformed, swelled, and rounded to a variable extent; and the gray or cortical substance is removed with the slightest friction. In the second case, the softening may occupy all parts of the brain; but the optic beds, striated bodies, and the middle lobe, are the most frequent seats of the lesion. Its extent is variable, from the size of a French bean to that of an entire hemisphere. The lesion is commonly unit; but sometimes both hemispheres are affected: finally, we meet in certain cases with a great number of softened points. There are ecchymoses like scorbutic spots. The ventricles in general contain a quantity of serosity which might impose on some the belief of there having been hydrocephalus. The arteries of the brain are frequently ossified.

For many interesting facts and ingenious suggestions respecting softening of the brain, I would refer the inquisitive reader to the *Recherches Anatomico-Pathologiques sur l'Encephale et ses Dependances*, by Professor Lallemand of Montpelier. — B.]

LECTURE LXXXVI.

Analysis of Symptoms of Cerebritis—Inconstancy of pain—Arachnitis, pain of —Intermittent pain—Headache—Phenomena of the eye—State of the pupils—Various affections of the functions of vision—Researches of Parent and Martinet —Relief by convulsions—Brain considered as a secreting organ—Dangerous effects of opium; delirium—Phenomena of organic life—Vomiting in hydrocephalus—Sympathies of the digestive and respiratory systems—Treatment of hydrocephalus—Of internal remedies.

Before we leave the subject of inflammation of the brain, I shall draw your attention to a brief analysis of some of the more prominent symptoms of this disease; and here I am anxious to impress upon you, that the true mode of studying this subject is not by reading the descriptions given by this or that systematic writer, but by the careful perusal of *monographs*, in which the details of a great number of cases, occurring under different circumstances, are accurately reported. You would be mistaken, indeed, if you

were to conclude that you had acquired a thorough knowledge of the symptoms of phrenitis or arachnitis by reading the description of Cullen, Thomas, or Mason Good. The only mode of studying the subject properly is, to take accurate notes of every case which you meet with, and to study with care those monographs in which a number of cases, attended by different symptoms, are detailed with impartiality.

I would not occupy your attention further with this subject, but that there is much error prevailing with respect to inflammation of the brain and its membranes. Persons are in the habit of supposing that these symptoms are always constant and well-marked, but, the truth is, they are subject to very great varieties. The first symptom, to which I shall call your attention, is *pain*. This, you will recollect, is a prominent symptom of most visceral inflammations, where the disease is situated on, or close to, the surface of the organ; but, when it is deep-seated, this symptom becomes more or less obscure. Now, in a case of arachnitis, we have a double source of pain — one depending upon the affections of the serous membrane, the other arising from the circumstance of disease being situated on the surface; and hence it is that, in the great majority of cases of arachnitis, pain is a constant and prominent symptom. Still, if you were to conclude that pain is *always* present in arachnitis, you would be wrong — for there are many cases on record in which it was either partially observed or completely absent. You will be greatly assisted in your pathological studies by attending to the different results of inflammation of analogous structures, for we find that in some of the inflammatory affections of serous membranes there is little or no pain. We may, for instance, have pleuritis, pericarditis, and even peritoneal inflammation latent, so far as pain is concerned; nay, many persons have gone so far as to say, that it is only where the muscular tissues of the belly are engaged that we have pain in peritonitis. I have seen pericarditis run through all its stages without any pain being complained of by the patient. Now, if this absence of pain be a matter of no unusual occurrence in some inflammatory affections of the pleura, pericardium, and peritoneum, there is no reason why it may not occur in some cases of arachnitis. Still, it must be acknowledged that pain is one of the most remarkable and constant symptoms of arachnitis, and that, of all the serous membranes, the arachnoid seems to be endowed with the greatest sensibility.

We might inquire here, whether the pain of cerebral inflammation be significant of any particular lesion of the brain. I believe that upon this point the state of our knowledge is very unsatisfactory. Pain as a symptom of cerebral inflammation occurs in very different cases. We may have it in connection with disease of the superior, lateral, or inferior parts of the brain; we may have it in cases where the result of the disease is a serous, hemorrhagic, or purulent effusion. The rule, then, to be borne in mind, is this: first, that it is present in the great majority of cases of arachnitis;

next, that it may accompany many different lesions; thirdly, that it may be absent; and lastly, that, with the same lesions, we may have pain in one case and absence of it in the other.

The next subject for inquiry is, does the seat of pain generally point out the seat of inflammation? Andral distinctly affirms that it does not. In some cases, pain of the frontal region has been found to accompany disease of the ventricles, and pain in *one side* of the head, an affection of the arachnoid covering of both hemispheres. We see the same thing occurring in the case of other serous membranes. Thus, in the pleuritic inflammation of phthisis, pain is very seldom felt in the situation of the disease, but generally lower down; and I have seen some cases in which pain has been complained of only in the sound side. I recollect a case of very extensive pneumonia, in which the patient complained only of some pain in the region of the kidney and small of the back.

The pain which accompanies arachnitis generally sets in at an early period of the disease, and is characterized by great intensity — two circumstances in which it resembles the pain of pleuritis. In most cases, it is found that anything that impedes or oppresses the circulation of the brain, increases this pain; and hence it is that some practitioners are led to think, that, if pain of the head be relieved by pressure, it cannot be inflammatory. Now, I wish to call your attention to this point, because, in some cases where evident marks of arachnitis were found after death, it was observed that during life the pain of the head was relieved by pressure. The patients have been found with a bandage tied firmly round the head, from which they experienced decided relief, and yet a *post mortem* examination gave unequivocal proof of the existence of arachnitis. So far, then, as these cases go, it appears that the mere fact of pain being relieved by pressure, does not prove that it is unconnected with an inflammatory cause. The pain, too, of an arachnitis may be intermittent, and continue to exhibit this character even for a considerable length of time. I have seen many instances of this in children, where the little patient was seized with acute pain of the head at a particular time of the day, which, after a few hours' duration, subsided, and then returned again the next day precisely the same hour, and continued in this way for several weeks, until at length his friends were surprised by the unexpected supervention of coma, convulsions, or blindness. I knew two cases of this kind in which the intermittent character of the pain was so prominent as to engross the practitioner's whole attention; so that the real nature of the affection was overlooked, and bark prescribed. I have now witnessed three or four of these regular quotidian attacks of pain in children, which, after continuing for days and even weeks, were suddenly followed by perfect blindness — in some cases with and in others without coma.

You might here ask, whether pain is to be considered as a diagnostic of arachnitis? I cannot say it is. We constantly meet with severe pain in the head without arachnitis, and every one knows

that the headache of fever is by no means an indication of inflammation of the brain. In many cases of hysteria, the headache and determination of blood to the head are violent, and yet unconnected with inflammatory action. I know a young lady who is frequently attacked with most agonizing headache, accompanied by violent throbbing of the carotids and great heat of the face and scalp. Yet, in this case it is plain that the pain cannot be inflammatory, for she has been subject to these attacks once or twice a week for the last six years, and yet continues otherwise in a state of good health. If her disease were to be measured by the violence of the pain and determination of blood to the head, it would be natural to expect that death would have long ago put a period to her sufferings. This is another proof of the truth of the opinion, that there is no single pathognomonic symptom of disease. Bear this in mind. I might go farther, and say, that, whether we looked to symptoms or to signs, the rule was the same. The man who merely looks to a single sign or symptom will frequently err; it is only from the whole group of signs and symptoms presented by a disease that we can arrive at any accurate diagnosis.

The state of the eye, in cases of arachnitis particularly, has attracted much attention. On this subject much valuable information has been obtained by the laborious investigations of Andral, of which I shall give an abstract. He states that the phenomena of the eye, in cases of cerebral inflammation, may be reduced to three classes; its motions, the various conditions of the pupil, and the state of vision. With respect to the first of these, it may be observed that in some cases we find the eyeball in constant motion; in others, it is quite fixed; while in others the balance of muscular power is lost, and there is a constant tendency to strabismus of one eye or both. Of all these varieties in the state of motion, the last appears to be the most valuable, so far as the diagnosis of arachnitis is concerned. By many persons this strabismus is looked upon as a sign that *effusion* has taken place, and that the disease has reached its incurable stage; a position which I am inclined to doubt, from having seen cases recover in which this symptom was present. However, Andral looks upon strabismus as a very valuable sign, and thinks that, of all the lesions of motion of the eye, it is the most important with respect to the diagnosis of *arachnitis of the ventricles*. With respect to the condition of the pupil, it is stated in books that in the early stage you have a contracted, and in the advanced a dilated pupil, and that the latter condition signifies that effusion into the brain has taken place. Now, the truth is that this statement must be received with great caution, and as admitting of numerous exceptions; for it has been established that the same lesions of the brain are sometimes accompanied by very different conditions of the pupil, and *vice versâ*. Parent and Martinet, who have investigated the subject carefully, are the best authorities on this point, and I shall give a brief abstract of their experience. In cases where *both pupils were dilated*, they observed

that in some there was effusion into one of the ventricles, in others, into both. In cases where there was no dilatation, they observed that in some there was serous or purulent effusion under the arachnoid, while in others, in which there was no effusion whatever, the pupil was dilated. Lastly, it was found that in some cases, where only one pupil was dilated, there was effusion *into both sides of the brain*. You might here ask, whether effusion into the substance, or on the surface of one side of the brain, is connected with a dilated condition of pupil? In reply to this, it may be stated that effusion into the substance — not of one, but of both hemispheres — has been known to be accompanied by a contracted state of the pupil to the last. You may also have one pupil contracted and the other dilated; nay, you may have *an alteration of these conditions* — the right being dilated to-day, the left to-morrow. The mere circumstance, then, of dilatation or contraction of the pupil is no sign, when taken by itself, as to the seat or even the existence of effusion; for you may have either condition with or without effusion, and you may have dilatation of the pupil of one eye with an effusion into both sides of the brain. As a general rule, however, it seems to be made out, that, in most cases of cerebral inflammation terminating in effusion, there is often, towards the advanced period of the disease, some dilatation of pupil, and that this condition generally marks the occurrence of effusion.

With respect to the affections of the function of vision, there are great varieties. Some patients have double vision — others see sparks of fire, or *muscæ volitantes*. There are many other phenomena of the kind, causing a great variety in the symptoms; and this variety is found to depend more on the susceptibility of the brain to irritation, rather than on the mere existence of irritation of the serous membrane investing it. The same rule applies to all cases of serous inflammation, the phenomena of inflammation varying according to the susceptibility of the organ which the inflamed membrane covers. Thus, for instance, one patient will have pericarditis with palpitations of the heart, another without them; their occurrence or non-occurrence merely showing that the heart is more or less susceptible to irritation. So it is with respect to the brain, and the symptoms of deranged vision are connected with the greater or less susceptibility of the organ, which we know varies very considerably in different persons. This remark applies to all the forms, and, I believe, all the phenomena of meningitis.

In acute disease of the brain and its membranes, we often have convulsions and paralysis, and in these symptoms also we find great variations: in some we have convulsions of one side, in some of both, in others we have paralysis, but scarcely any convulsions. The same remark also applies to these symptoms, as to some already mentioned—namely, that we cannot from them alone form an accurate estimate of the situation or amount of disease. You may have convulsions and paralysis of various kinds with the same

kind of lesion, and you may have a variety of lesions with the same paralysis and convulsions. The only thing that appears to be pretty well established is this — that, generally speaking, in cases where the right side of the brain is engaged, you have conclusions and paralysis of the left side of the body, and *vice versâ*.

Before I proceed to speak of delirium, I think it necessary to say a few words more with respect to convulsions, as I find Andral has not touched on a point to which I beg to call your attention. The occurrence of convulsions in a child, labouring under symptoms of inflammation of the brain, is always looked upon as formidable; and indeed it is natural that convulsions, to persons unacquainted with pathology, should seem to point out a great intensity of disease. I have, however, been long of opinion that convulsions occurring during the existence of hydrocephalus in children, or of meningitis in adults, are not so dangerous as persons generally think. I will even go so far as to say, that the worst cases I have seen, in which a cure was effected, were those in which there were the greatest and most violent convulsions; and that, in most of the cases which appeared to go on without any benefit from medicine, there were scarcely any. I am of opinion that convulsions are often of benefit by giving relief to the brain. This statement must appear somewhat paradoxical, but I trust I shall be able to prove to you that it has some foundation in truth. Broussais has taught that there appear to be two great modes of reaction in the economy, to obviate the effects of abnormal stimulation applied to important viscera — fever and convulsions. The irritations which attack the cerebro-spinal system may be relieved by convulsions; those which attack the viscera may be relieved by fever and secretion. This doctrine, I think, might be expressed otherwise. The irritations of organs are often relieved by an increase, with or without alteration, *of their secretions*. But, as we have used the term *secretion* to express something material, we apply the proposition merely to the viscera of organic life. Now, it may also be extended to the organs of animal life. A violent expenditure of nervous power may relieve the brain or spinal cord, and delirium and convulsions prevent or modify organic changes, just as secretion from the lung or bowels may prevent ulceration.

I have said that the brain might be relieved by convulsions. Let us, holding this assertion in view, compare the phenomena and results of apoplexy with those of epilepsy. In the first place, it is to be remarked that the earlier phenomena of both are the same — namely, an active congestion of the vessels of the head. Any one who has seen the first stage of both must admit this. But let us follow them up through the remaining stages. In the one, we have the determination to the head, followed by convulsions more or less violent and protracted, which, however, subside after some time, and the patient gets well; in the other, there is either death from the violent determination of blood and probable effusion, or, if the patient recovers, there is very often paralysis, showing that injury

has been done to the substance of the brain. Now, here we perceive that the case of determination without convulsions is that in which there is either death or recovery with paralysis; there are no such bad consequences to be dreaded where the determination to the head is followed by convulsive fits. In apoplexy we have congestion followed by death, or recovery with paralysis; in epilepsy we have congestion, convulsions, and relief. It is plain that, if we admit the identity of the phenomena in the early periods of both, we must then also admit that the only cause of relief we can ascertain is convulsions. This idea of the subject will explain how it is that a man may continue for years subject to repeated attacks of cerebral congestion, and yet to continue to enjoy tolerable health. It will also explain why it is unnecessary and sometimes even dangerous to bleed in epilepsy. It also shows why it is so often unaccompanied by paralysis, because the brain is relieved by the expenditure of its nervous energy on the muscular system. I think we should generally look upon the occurrence of convulsions, in a case of cerebro-spinal irritation, in the light of an attempt at a crisis made by nature itself. What is a crisis? An organ labouring under irritation is suddenly relieved by a new process taking place, either in itself or in some other part; and when we come to examine what these modes of relief are, we find them to consist in the occurrence of supersecretion, hemorrhage, exanthematous eruptions on the surface, or convulsions. There is no doubt that, when we look to the results of the sudden supervention of a copious secretion in an inflammatory affection of any secreting organ, the source of relief is manifest. If we take two cases of hepatitis or bronchitis — one attended with copious secretion, the other without any secretion at all — it will be easy to conceive how much more dangerous the latter is, and how much more difficult to manage. Now, if we consider the brain in this point of view, we find that it is not a secreting organ, in the ordinary acceptation, and that the only mode in which it can relieve itself is by the expenditure of its excess of nervous energy on the muscular system, or by the same expenditure of mental energy, as in the case of high delirium. I think we might fairly draw an analogy between this mode of relief and that which, in other diseases, is the result of hemorrhage or secretion. One fact, at all events, appears certain, that in two most remarkable cases of different diseases—each, however, characterized by the same phenomena in the early stage, namely, active determination to the head — we find that the case which turns out favourably is that in which convulsions occur (namely, epilepsy); while in apoplexy, where these symptoms are absent, we have either death or recovery with paralysis.

If this opinion be well grounded, it would militate strongly against the practice of checking the convulsions of meningitis by opiates. I feel convinced that this practice is wrong and dangerous; its effects may be as injurious as the arresting the reactions by astringents in a case of acute inflammation. There are two ways in

which we can explain its bad effects. In the first place, opiates prove detrimental by checking the convulsions, which appear to be a mode of relief adopted by nature; and, next, they must do mischief from their well-known tendency to add to the existing cerebral congestion. I have now seen a good many cases of meningeal inflammation in which convulsions took place, and where opiates were employed to remove them, and feel compelled to state that the opium has certainly relieved the convulsions, but the patients have afterwards fallen into a state of profound coma, from which they never recovered. I have witnessed this so often, that I should not discharge my duty properly, did I not warn you against the employment of opium in arachnitis. The same rule most commonly holds good in cases of visceral inflammation, where an organ is in a state of irritation, and has its secretions suppressed. Here also opium, by arresting secretion and increasing congestion, will be productive of bad effects. I allude here particularly to the treatment of pneumonia by opium, as recommended by Dr. Armstrong, who lays great stress upon its use in full doses after having premised a single bleeding. I have had some experience of this mode of treatment, and find that the effect of the opium is not to remove, but to convert a manifest into a latent disease. I have seen the pain, dyspnœa, and cough subside, but the fever continued, and the destructive process of the lung went on as usual. This is the result of my experience.

I shall now make a few observations on the occurrence of delirium in disease of the brain. In one of my former lectures I alluded to the important fact, that, in the majority of cases of meningitis, where delirium was present, there was inflammation of the convexity of the brain. I stated also, that, when inflammation attacked the base of the brain, we might have it going through all its stages without delirium, and pointed out the importance of this in favour of the phrenological doctrines. Andral admits the occurrence of delirium in case of inflammation on the convexity of the brain, but his reasoning upon this subject appears to me to be inconclusive. He divides affections of the convexity of the brain into those which are characterized by delirium through their whole course, and those in which coma is the most remarkable feature; and seems to think that, where coma is the most remarkable symptom, the results of the case are unfavourable to phrenology. But we shall find, on examining these cases, that, in many of them where coma was the predominant feature, there had been delirium in the commencement. He gives the details of thirty-nine cases accompanied by delirium all through, in thirty-six of which there was disease of the convexity of the brain, either simple or complicated with arachnitis. As far, then, as his first set of cases go, they are in favour of the opinion that inflammation of the convexity of the brain is most commonly attended by delirium. It appears, also, that in those cases in which coma was the most remarkable symptom there was more or less delirium in the commencement; so that,

whether we take the cases in which there was delirium all through, or those in which there was coma, the conclusions appear to be in favour of the doctrines of phrenology.

I shall now proceed to make some remarks on the phenomena of organic life in cases of cerebral inflammation. In the first place, with respect to the tongue, we find that in simple arachnitis it is but slightly affected; there may be some trifling degree of foulness, or it may be quite clean and moist. You will observe the value of this, as connected with the diagnosis of irritation of the brain from disease of the digestive system. There are many cases of irritation of the digestive system putting on the semblance of hydrocephalus to such a degree as even to mislead an experienced practitioner. Now, if it be true that in simple arachnitis the tongue remains clean, it furnishes us with very material information, as, under such circumstances, our attention will be directed to the true seat of disease. Andral says, that in some cases of arachnitis he has found the tongue red, or dry, or foul, but that at the same time there was disease of the digestive system. The majority of his cases, however, were simple, and exhibited no marks of an affection of the tongue or digestive system.

There is one more symptom on which I wish to offer a few observations, and that is the occurrence of vomiting in the hydrocephalus of children. In all cases where there is obstinate vomiting, particularly in children, you should have your suspicions roused, and look carefully to the state of the head. Vomiting is a symptom which occurs in many cases of arachnitis; in some it is slight, in others more constant, while in a third class it is harassing, incessant, and produced by swallowing the most unirritating substances. The nature of the fluid rejected from the stomach is various — being sometimes bilious, sometimes mucous, sometimes only consisting of what had been recently drunk. In some of these cases you will find the symptoms of incessant vomiting, unaccompanied by pain of the stomach, tenderness of the epigastrium, or any other sign of disease of the digestive system. I have even seen it coexisting with a good appetite. Many persons have been lost by such cases having been mistaken for disease of the digestive system, the practitioner being ignorant that vomiting was here only symptomatic of disease of the brain. No matter what the situation of the meningitis may be, it is now established that you may have vomiting as a common symptom. I recollect the case of a delicate child, about seven years of age, who laboured for some time under catarrhal fever, on the subsidence of which she got an attack of vomiting, which came on at different times in the day, but without headache, delirium, or intolerance of light. This vomiting continued from day to day; and, at the end of the week, the pupils became suddenly dilated, and coma set in, under which she died. There is one very remarkable circumstance connected with this subject, with which I am anxious you should be acquainted. *Where this incessant vomiting is present, you will have the other symp-*

toms of meningitis more or less latent. This illustrates a law before alluded to, that, where the phenomena which are the result of sympathy with an affected organ are very prominent, those which characterize the disease of the organ itself are more or less latent. If we take the reverse of the former case, and consider a case of gastric disease, we know that the irritation of the stomach will produce violent cerebral symptoms, and that here also the same law is exemplified — for we shall have absence of pain, tenderness, and vomiting. The great value of this rule is, that a knowledge of it will put you on your guard, and that the mere absence of the peculiar symptoms of an affection of an organ possessing extensive sympathies, should not lead you to conclude that there was no disease of that organ. In some remarkable cases of gastritis, the principal symptoms observed were convulsions and delirium; there was no vomiting or thirst, very little pain on pressure, and nothing remarkable in the condition of the tongue. The same latency of inflammatory disease is frequently seen in cases of delirium tremens.

With respect to respiration and the state of the pulse in meningitis, there is very little to be said. You may have meningeal inflammation with every variety of pulse — strong, weak, full, rapid, slow, or intermittent. Generally speaking, the pulse is, towards the close of the disease, feeble and intermitting, but you may have the disease running through all its stages, without any peculiarity in the character of the pulse. Respiration seems to be very little affected, and this would appear to favour the opinions of Sir Charles Bell. There is no doubt, at least, that the sympathy of the brain with the respiratory system is much weaker than with the digestive.

TREATMENT OF HYDROCEPHALUS.

I shall occupy your time but very briefly on the treatment of the hydrocephalus of children, as it appears to me to be a disease in which, of all others, the principles of treatment are most simple. The old idea of this affection was, that it was a species of dropsy, depending on the relaxed state of the cerebral vessels, and hence the term hydrocephalus. Modern pathology has shown that the occurrence of serous effusion is a mere accidental circumstance, as it is present in one case of arachnitis and absent in another. When it does occur, however, *it is the result of inflammatory disease*, and it is to the prevention and cure of this that the practitioner must direct his attention.* With the symptoms of this disease I

* [The opinions advanced by former writers, that the chief predisposing cause of hydrocephalus is a scrofulous habit, and that when scrofula attacks the membranes of the brain, its symptoms are usually those of acute hydrocephalus (*Cyclopedia of Practical Medicine*), have been fully confirmed by the experimental observations of Drs. Gerhard and Rufz, made in the Children's Hospital at

shall not take up your time, as you will find them sufficiently detailed in books; but, with respect to treatment, I shall say that hydrocephalus is a disease *much more* under the influence of treatment than persons generally think. It is said that, when once effusion has taken place, the case is hopeless, and nothing can be done. This remark appears to me to be unnecessary, for there is no symptom from which you can venture to assert that *effusion* have set in. You may, from the inflammatory state of the brain, have delirium, coma, deafness, blindness, and paralysis, without any effusion of serum; and in many cases life has been saved, even after the appearance of all these symptoms.

This term *effusion* is one of the bugbears of medicine. Many patients are lost from the prevalence of false ideas connected with this subject; for, as soon as *effusion* is supposed to have set in, the efforts of the practitioner are given up. Hundreds of patients die of bronchitis and pneumonia, in whom life might be saved if the

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Paris, in the period between 1832 and 1834. These gentlemen "state, and prove by rigid deductions, that the acute meningitis, or acute hydrocephalus, if the old term be preserved, is really a tuberculous disease; it is inflammatory in its direct action, and the tuberculous granulations are either formed already in the brain and followed by the acute inflammation, or they are secreted by the inflammatory process, the vessels throwing out at the same time lymph and tuberculous matter. This disease is by far the most frequent of the acute inflammatory disorders of the brain in children, especially from the age of two years to that of puberty; and we therefore separate this disease from other acute affections of the brain, laying stress upon the peculiar nature of the disease as connected with the tuberculous secretion, and looking upon the affection as one and the same, whether there is or is not an effusion of serum into the ventricles. This view, then, of the pathology of the disease, renders the term hydrocephalus obviously improper; and it was this which induced us to substitute that of tuberculous meningitis, which has since come into general use." — *Dr. Gerhard on the History of Tuberculous Meningitis — Medical Examiner, Vol. III., No.* 19.

Dr. Gerhard published his original observations in 1834 in the *American Journal of Medical Science;* and subsequently in 1835, a memoir on the acute hydrocephalus of adults, "proving that it was identical with the tuberculous meningitis of children, and depended upon the same cause. This was the first memoir which proved that the disease was as distinctly characterized in adults as in children, and that the anatomical lesion was in both cases independent of the effusion of serum into the ventricles of the brain."— Dr. G., *ut supra.* Dr. Hall had indicated a similar origin of hydrocephalus. The ultimate cause of the disease is, Dr. Gerhard thinks, the lymphatic temperament; or, as other writers have termed it more vaguely, a tuberculous diathesis. —B.]

symptoms of *effusion* had been treated for those of inflammation; and so it is with respect to the brain. This effusion is not the disease — it is not even a constant result of the disease. We have no certain means of ascertaining its existence; and we know that, by a persistence in antiphlogistic treatment, life may be often saved, even after all the supposed symptoms have occurred.

Take this with you as a rule in medicine: always to keep your eye more upon the causes than the effects of disease.

The treatment of hydrocephalus in the child should always be active, and conducted on the same principles as those of general encephalitis in the adult. Shaving the head, bleeding when practicable, *repeated leeching*, *cold affusion*, *calomel*, and *purgatives* — these are the great measures upon which we are to rely for success. It is satisfactory, too, to reflect, that many cases have been saved by the prompt and steady adoption of this simple mode of treatment.*

OF INTERNAL REMEDIES.

The use of mercury seems to be that on which you should most rely. Some of the most singular recoveries have occurred after ptyalism has been produced. Let me remind you, however, that the rules connected with this mode of treatment, which I pointed out in speaking of hepatitis, apply equally in this case. There is a terrible consequence of mercurial action in the lymphatic temperament, with which you should be acquainted; I allude to violent and destructive inflammation of the soft parts of the mouth and face, which has got the name of the *mercurial cancrum oris*. An œdematous inflammation of the cheeks, lips, and tongue, takes place, and, if not checked, rapidly runs on to extensive ulceration. I have seen one cheek, half of the nose, the lower eyelid, and the opposite angle of the mouth, utterly destroyed, in a case where but

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* [If leeches cannot be procured, cups to the nucha and above the mastoid processes, or on the spine, between the shoulders, will answer. After suitable depletion, and when we deem the period proper for counter-irritation, a large blister to the neck or between the thighs has been seen by Billard (*Diseases of Infants*, Stewart's Translation) to be followed with success. Some stress, and deservedly, is laid by Dr. Mills of Dublin on the use of the tartar emetic ointment, applied to the vertex or occiput, of such strength and with such frequency as soon to cause a pustular eruption and purulent discharge, which will be found especially useful in cases of repelled scabies, preceding the disease in question. In the acute form we cannot expect anything from a caustic issue on the vertex, as recommended by some. "Mercury, to be effectual, must," Dr. Chapman thinks, "be applied in a very resolute manner," internally and externally. — B.]

five grains of calomel were used. This drawing represents the disease, after a frightful perforation of the cheek. In this case the quantity used was nine grains. I have seen the disease from the use of so small a quantity as a grain and a half of calomel! These facts show that there is a state of the constitution in which a minute dose of calomel may have terrible effects. The same, too, may arise from the external use of mercury. I recollect the case of a young woman in the Meath Hospital, whose head was rubbed with *one dram* only of mercurial ointment, for the purpose of destroying vermin. She was attacked, and with difficulty saved.

The disease may also come on suddenly in a patient who has been for some time using mercury in considerable doses; but this is the rarest case.

You recognise this disease by the sudden supervention of great swelling of the lips and cheeks, so as to completely alter the expression. The tongue is also swollen. All these parts are hot and tender to pressure. The breath is fetid, and the internal surface of the mouth excoriated, and often covered here and there with patches of lymph. At other times we have a circumscribed œdematous swelling, occupying the centre of the cheek, which runs on to ulceration; but most commonly the ulceration of the external parts begins at the depending angle of the mouth.

In a case of this kind, if you are called before ulceration has taken place, I believe you can often save your patient, and prevent destruction of the face. Treat the disease as a violent inflammation; use repeated leeching, poulticing, and the warm bath. *While you do this, you must keep up your patient's strength by light nourishment and wine.* Apply to the internal ulceration the mel æruginis, the nitrate of silver, or the chloride of soda. I have now saved many cases by bold and repeated leeching. I remember one case of a man in which ninety leeches were used; he recovered perfectly.

In the treatment of this affection, it is of the utmost consequence to attend to the position of the patient. By keeping him as much as possible upright, or by preventing him leaning constantly on one side, we do much to prevent the occurrence of the ulceration of the angle of the mouth.

As far as I can see, hydrocephalus, when taken in time, is a very manageable disease; and there is only one case in which it is difficult to treat, and that is where the cerebral affection is accompanied by symptoms of gastro-enteric disease. In several cases of hydrocephalus, this complication certainly exists; and you have first symptoms of disease of the digestive tube, and then of the head. Such cases as these are involved in great difficulty, and in their treatment you run the hazard of falling into a twofold mistake. The first is your acting on the supposition that the disease of the head is only sympathetic, and that it will subside as soon as the abdominal symptoms are removed; the other is occupying your attention exclusively with the head. Now, there is one rule with

respect to this, which I think will serve to guide you through many difficulties, *and this is, never to neglect the head.* Though you have first an affection of the digestive system, and then of the head, it is better (even though the symptoms of the latter still continue) to pay attention to the head. You can do this at the same time that you are attentive to the condition of the digestive organs. Another rule is, that the cases of disease in which the purgative plan does not answer are generally those in which there is primary inflammation of the digestive tube. Dr. Cheyne, in speaking of the treatment of hydrocephalus, says, that some cases are benefited by purgatives, others not; and that the latter are those in which there is disease of the intestinal canal. In such cases you will not irritate the bowels, or add to the existing inflammation by purgatives. Let the bowels be kept open by enemata, and direct your attention immediately to the head. Children with largely developed heads, and of a strumous diathesis, are very subject to this disease; and I feel convinced that the present rage for the early mental education of children has a strong tendency to produce it in subjects of this description. I believe there are many cases of fatal hydrocephalus from which the poor victims would have escaped, but for the pernicious efforts of the parents to make them literary prodigies. I have observed many cases of this kind among the children of persons who, having been originally situated in an humble sphere, and deprived of the benefits of education, accumulate wealth; and then, feeling in their new condition the want of education, are anxious to communicate it to their offspring; and, with that view, have them educated with too much care, and from too early a period. The child is constantly kept at his books — his little mind is perpetually tasked — a degree of cerebral excitement is kept up — and, while he is delighting his gratified parents with the manifestations of a precocious intellect, his health is neglected, and the seeds of disease are insensibly sown. One of the most ordinary consequences of this early application of the mental powers is hydrocephalus. These little creatures, too, have a congenital disposition to disease of the brain, for they have generally large heads. Such cases are examples of the results of an arrest of development. A relative condition of head exists similar to that which occurs during fœtal life, and this is always accompanied by a remarkable susceptibility to inflammation. This peculiar development of head also produces a precocious state of intellect, which is increased by the pernicious habit of obliging children to study at too early an age. Where you meet with children suffering under these circumstances, you will not discharge your duty properly if you do not point out to the parents the mischievous tendency of their conduct. In such cases as these it may be justly said that ignorance is bliss.

LECTURE LXXXVII.

Apoplexy—Cerebritis and meningitis—Definition of apoplexy—Simple or nervous apoplexy without disorganization—Complicated with other diseases—Congestive or serous apoplexy—Dr. Abercrombie's opinions—Apoplexy with extravasation—Sites of extravasation—Absorption of clot—Apoplexy in children.

We were occupied at our last meeting in considering some of the most prominent symptoms of meningeal inflammation; and I beg of you to recollect, that all these symptoms, with the exception of pain, are those which ordinarily characterize inflammation of the substance of the brain itself, and are to be explained by referring them to some lesion in the functions of that organ. It appears, then, that the symptoms of meningitis, with the exception of pain, are symptoms of an affection of the brain itself; and this is a point which you must always bear in mind, when you agitate the question as to the possibility of making a diagnosis between meningitis and encephalitis. We have a set of symptoms characterizing meningeal inflammation, the majority of which belong to irritation of the brain itself; and we find that these may exist with or without any *perceptible* alteration in the cerebral substance. Now, in cases where you suppose the existence of meningeal inflammation, and find these symptoms present, it would be venturing too much to assert that there was no complication with organic disease of the brain; and, therefore, we must conclude that, in most cases, it is nearly impossible to distinguish between inflammation of the substance of the brain and of its membranes.

In speaking of the more important symptoms of cerebral inflammation, I alluded particularly to convulsions, and stated that, as far as my observations went, this symptom, formidable as it may appear, is not in reality so unfavourable as it is generally thought to be. In fact, there are many cases of affections of the brain, accompanied by convulsions, in which the danger is by no means so great as in others of a different description; and many of the worst cases are those in which convulsions are absent, or only trifling. I think we may look upon convulsion as being more or less a source of relief to the brain, when labouring under the excitement of irritation or inflammatory disease. You are all aware, that one of the great functions of the brain is to regulate and control the motions of the muscular system. If a man exercises his limbs violently for some time, he becomes tired and exhausted; he cannot pursue the same exercise any longer, for in addition to whatever the muscular system may suffer, there has been a great expenditure of nervous energy; and if he should attempt to keep up the same exertions, such a degree of muscular and nervous debility is superinduced that syncope is the consequence. Now, the expenditure of energy produced by the supply of nervous power to the muscles, seems to bear a strong analogy to the secretory dis-

charges from other viscera. In the case of irritation or inflammatory affections of other organs, you are all aware that there is nothing which gives such speedy and effectual relief as supersecretion, or an increased action of the secreting vessels of the affected organ. Now, if we look upon the expenditure of nervous energy in the same light (and I see no reason why we should not), we can easily conceive why it is that convulsions relieve the irritation of an over-excited brain. I drew your attention strongly, at my last lecture, to the curious and important fact, that if we compare apoplexy and epilepsy, with respect to the danger and the chance of disorganization attendant on each, we shall find the danger is infinitely greater, and the chances of organic change more numerous, in the former than in the latter. In epilepsy, where the convulsions are violent, we seldom have a fatal termination of the fit, and there is rarely lesion of the substance of the brain, until the disease has lasted for a great length of time. This is not the case in apoplexy. Here, as I have already stated, we have two cases of active determination to the head: in one case there are no convulsions, and we frequently find the result to be death, or extravasation with paralysis and slow convalescence; in the other, we have violent convulsions, followed by rapid recovery and no disorganization. From this, it would seem reasonable to conclude, that convulsions are a mode of relieving the brain, adopted by nature, and that their occurrence in hydrocephalus should not be looked upon as unfavourable. Now, if this be true, it must strike you, that nothing can be more dangerous and improper than to take any steps to control an attack of convulsion during the prevalence of hydrocephalic symptoms. The true mode of treating them is to adopt measures calculated to relieve irritation of the brain, and not hazard the patient's safety by following the ordinary but mischievous mode of attempting to control the salutary efforts of nature. I allude here particularly to the practice of administering opiates and antispasmodics, a practice which I firmly believe to be fraught with danger.

We have to-day to consider another form of cerebral disease, scarcely less important than those with which we have been hitherto engaged. In all the former instances, we find the determination of blood to the brain followed by that organic change which we term inflammation. But we may have accumulations of blood in the brain, unaccompanied by inflammation, and this brings us to the consideration of apoplectic disease. The term apoplexy, as I suppose you all know, is derived from a Greek word, signifying a stroke or blow. It is a term which, in the present state of medicine, has been very frequently abused, or at least employed in very different senses, and hence the many erroneous opinions respecting it. The true meaning of the term expresses an alteration of the phenomena of the life of relation, that is, of the functions of the cerebro-spinal system. In taking a view of the nature of this alteration, we find that the attack generally comes on in a sudden

manner, and that the functions of the brain are partially or completely suspended. You are aware that the manifest phenomena of the life of relation are those which belong to *sensation, muscular motion*, and *the intellect;* and that the system of the life of relation is composed of the brain, spinal cord, and nerves. Now suppose, for example, that a man gets an attack of apoplexy, we find him paralytic — here is a lesion of the muscular function. We find him insensible to external stimulants, he feels no pain — here is a lesion of sensation. We may find his sight, hearing, taste, smell, and touch, are injured; he lies in a state of insensibility, and is unconscious of everything passing around him — here we have an example of interruption in the performance of the intellectual functions. All these phenomena exhibit the various lesions superinduced by an attack of apoplexy, in the functions of those organs which subserve to the life of relation.

I have said that the term apoplexy is frequently abused in modern medicine. From the circumstance of most cases being accompanied by an effusion of blood on the surface or into the substance of the brain, the term has been also applied to sanguineous effusions into other organs, and we hear every day of pulmonary and hepatic apoplexy; terms implying the extravasation of blood into the substance of the lung or liver. The analogy, however, in such cases will on examination be found to be coarse, and the application of the term loose and improper. Apoplexy, as a cerebral disease, may occur with or without effusion; in either case, the disease, *quoad* the lesion of function, is the same; but to give the name of apoplexy to hemorrhage into the lungs or liver, is improper. The term apoplexy should be used only with reference to the brain, and applied to a particular train of lesions in the functions of the life of relation, occurring *with or without an effusion of blood, or even congestion.* When we have effusions of blood into other viscera, we may have them unaccompanied by any apparent lesion in the functions of the organ affected (a circumstance rarely met with in the case of the brain); and it would be much better to give some other name to those hemorrhages into the substance of the liver and lungs, than to designate them by one drawn from a loose and imperfect analogy.

The suspension of the phenomena of the life of relation, complete or partial, which constitutes apoplexy, may be connected with any of the following pathological conditions: — First, great congestion of the brain, in which the vascular system of that organ is overloaded, but without extravasation of blood or serum; this is termed *the congestive apoplexy.* In the next place, we may have this congested state of the vessels of the brain with an extravasation of blood on its surface. To the latter form, the *meningeal apoplexy* has been applied. Thirdly, with an effusion of blood into the substance of the brain, which is the most common case, and, lastly, we may have complete apoplexy without morbid appearance, or, if there be such, *quite insufficient to account for the phenomena.* A

man will fall down suddenly, he will lie in a state of insensibility, with stertorous breathing, coma, and paralysis, he will die with all the symptoms of the worst form of apoplexy, and yet, on dissection the brain may be found, *to all appearances, healthy.* This is what has been termed, by the older authors, the nervous or convulsive apoplexy; of the real nature of which we are still as ignorant as we are of the real nature of tetanus, hydrophobia, and other nervous diseases unaccompanied by perceptible organic change.

This is the *simple apoplexy* of Dr. Abercrombie, of which he gives several most important cases, and refers to others related by the older authors. You will at once admit that it is not more extraordinary that apoplexy should exist without perceptible organic change, than mania, tetanus, hydrophobia, and other affections. Of the fact there is no doubt. Such cases, indeed, are rare; which, in one sense, may be looked on as a fortunate circumstance. But in the progress of other diseases, this nervous coma, or apoplexy, is by no means uncommon. Thus, there is no symptom more common than coma in typhus; and yet, if you examine the head after death, you generally either find no lesion at all, or such as will not be sufficient to account for the symptoms. The coma, which occurs in cases of painters' colic, too, appears to be closely connected with this nervous apoplexy. You will recollect an interresting clinical experiment I made in the case of a patient with painters' colic, who had profound coma. In this case, I thought it probable that the condition of the brain bore no resemblance to sanguineous apoplexy, because the symptoms of painters' colic are seldom or never accompanied by hyperæmia of the nervous or other systems. Under this impression, I prescribed a full opiate, and this not only did not increase the coma, but, on the contrary, produced the very best effect, for the patient was amazingly improved the next morning. I do not so much mean to say, that opium is useful in nervous coma, as that, in this instance, at least, the coma was not of the congestive kind. It is not unlikely, too, that the coma of jaundice is of the same description, and unconnected with any decided hyperæmia of the brain. I am aware that in jaundice the coma is supposed by some to depend upon a bilious condition of the blood circulating in the brain; but there are so many cases of persons who have laboured under jaundice for years without having coma, that we must seek for some other explanation. Now, so far as we know of the encephalon in persons who have died of jaundice, it appears that little or no congestion exists; and hence it seems probable that the coma of jaundice is similar to that of nervous apoplexy.

I shall now proceed to the consideration of those forms of apoplexy which are connected with changes more or less apparent in the circulation of the head, and with which we are, consequently, better acquainted. I have told you that simple congestion of the brain may be accompanied by symptoms of apoplexy, or that we may have the disease presenting, in addition to this, an effusion of blood into the substance, or on the surface of the brain. The simplest

idea you can get of the condition of the brain in the congestive form, is to consider what its state is in persons who have been hanged. These persons have the vessels of the brain loaded with blood from the violent interruption of the venous circulation. Now, this increase in the quantity of blood circulating in the brain, may arise from two causes, one depending on the interruption of the venous circulation, the other produced by an increased action of the arterial system. Hence in certain cases of disease of the heart, where the blood is sent with great force to the head, there is a strong predisposition to apoplectic attacks. The kind of disease of the heart, however, which has been found most liable to produce this, is not, as you would suppose, Corvisart's active aneurism, but simple hypertrophy of the heart, where the cavity of the left ventricle continuing the same, its walls are increased in thickness and strength, so that, on the natural quantity of fluid, an increased impulse is exercised. Such, at least, is the result of Andral's researches, and there is every reason to place confidence in the accuracy of his conclusion.*

About this congestive apoplexy there appears to have been a good deal of misapprehension. You have all heard of *the serous apoplexy.* In this form, it has been supposed that the cause of the

* [In addition to the names of Broussais, Andral, and Lallemand, we may cite those of MM. Bricheteau and Bouillaud, and Dr. Hope, all of whom have pointed out numerous cases of the connexion between hypertrophy of the left ventricle and apoplexy. Bricheteau relates twenty cases of this coincidence; among others, of General Foy, the celebrated orator, and one of the liberal leaders in the French Chamber of Deputies. Bouillaud found in fifty-four cases of hypertrophy of the heart, that eleven exhibited also cerebral lesions, of which six were of apoplexy and five softening of the brain. Dr. Hope, in a paper read before the College of Physicians (1835), on the connexion between apoplexy and palsy with organic diseases of the heart, relates, that out of thirty-nine cases of apoplexy, disease of the heart was found to be coexistent in twenty-eight.

M. Bricheteau draws the conclusion, that the periods of life at which fatal apoplexy is most prevalent, are those in which disease of the heart (either hypertrophy of the muscular substance, or ossification of the valves and vessels), is of most frequent occurrence, namely, between forty and fifty, and between seventy and eighty years of age.

The deductions for practical guidance, from these facts, are clear. They are, an avoidance of all severe bodily exercise, as well as of all exciting emotions of the mind. We ought also, as Bricheteau recommends, to direct the occasional application of leeches over the region of the heart, instead of to the temples or any other part of the head — the internal use of digitalis, hydriodate of potassa, and other diuretics. See my Lecture (LXXIX.), in which the connection between hypertrophy of the heart and apoplexy is investigated. — B.]

compression of the brain, and all the other symptoms, is an effusion of serum, just as an effusion of serum into the cavity of the pleura will produce compression of the lung and dyspnœa. The idea which has been generally entertained is, that the effusion of serum is the cause of *all* the symptoms; and, in consequence, the same active treatment has not been adopted as in the other forms of apoplexy. This opinion will be best refuted by the investigations of Dr. Abercrombie, and I cannot do better than read for you the opinions of this eminent writer on the subject, as given in his celebrated and admirable work, which, I have no hesitation in saying, constitutes one of the brightest ornaments of British medicine.

"This distinction, which has been proposed between sanguineous and serous apoplexy, is not supported by observation. The former is said to be distinguished by flushing of the countenance and strong pulse, and by occurring to persons in the vigour of life; the latter by paleness of the countenance and weakness of the pulse, and by affecting the aged and the infirm; and much importance has been attached to this distinction, upon the ground that the practice which is proper and unnecessary in the one case, would be improper or injurious in the other. I submit that this distinction is not founded upon observation, for, in point of fact, it will be found that many of the cases which terminate by serous effusion, exhibit in their early stages all the symptoms which have been assigned to the sanguineous apoplexy; while many of the cases, which are accompanied by paleness of the countenance and feebleness of the pulse, will be found to be purely sanguineous; and one modification of the disease in particular will be described, in which these symptoms are very strikingly exhibited, while the disease is found to be sanguineous apoplexy in its most hopeless form.

"Portal has described a series of cases which afford the same result; of three, which presented all the symptoms of serous apoplexy, one was saved by repeated bleeding, and in the other two, which were fatal, there was found extensive extravasation of blood. Case XCVI., lately described, forms a remarkable addition to these observations. If any case could be confidentially considered as serous apoplexy, this was such. Dropsical effusion had existed in the body for months, and, in defiance of every remedy, it had been progressively gaining ground. There were symptoms indicating its existence, both in the thorax and in the abdomen; the patient then became comatose, with pale countenance, and died; but though dropsy was found in other cavities, none could be detected in the brain.

"In other parts of the body serous effusion is very seldom a primary disease: it arises as a result either of inflammatory action, or of impeded circulation, and takes place slowly, not accumulating at once in such quantity as to induce urgent symptoms. It is, therefore, in the highest degree improbable, that it should occur in the brain as a primary disease, and accumulate with such rapidity as to produce the symptoms of an apoplectic attack.

"The quantity of fluid effused, bears no proportion to the degree of the apoplectic symptoms. We find it in small quantity, though the apoplectic symptoms had been strongly marked and long-continued; we find it in large quantity when the symptoms have been slight; and, finally, we find most extensive effusion in the brain where there have been no apoplectic symptoms at all. The direct inference from these facts is, that, in the cases of apoplexy with effusion, the presence of the fluid cannot be considered as the cause of the apoplectic symptoms."*

The same error has been committed with respect to hydrothorax, a disease almost never primary, but the result of either pleuritic inflammation, obstruction of the heart or lungs, or some analogous cause. The cause of the symptoms is not the mere effusion of fluid, but some preëxisting disease which has given rise to a serous effusion. In Dr. Abercrombie's work, you will find the remarkable fact stated, that there may be a copious effusion of serum in the head, without producing apoplectic symptoms. The following case, mentioned by Dr. Abercrombie, furnishes a remarkable illustration: — A patient, who had laboured under hypochondriasis for upwards of thirty years, began to decline rapidly in health. He was extremely feeble, his bowels costive, his sleep disturbed, and his appetite gone. This state continued for some time, and he began to sink, but he never complained of headache, giddiness, convulsions, or paralysis, and his mental powers remained unimpaired until a very short time before his death. Yet, on opening the head, there was an exceedingly copious effusion of serum found under the arachnoid: and in some places this was so great as to give the arachnoid the appearance of small bladders filled with water. The ventricles were distended with fluid. Dr. Abercrombie gives another case, where the quantity amounted to eight ounces, and notices a case, mentioned by Dr. Marshall, of a maniac who died of mortification of the feet; a few hours before death he became perfectly rational, yet effusion was found both on the surface of the brain and in the ventricles, amounting to more than a pound.

All these facts go to prove, that what has been termed serous apoplexy is only an apoplectic attack depending on congestion of the brain; that in some cases we may have this congestion accompanied by serous effusion, in others not; that the effusion is secondary, and by no means of constant occurrence; and that altering our practice, and pursuing a less active plan of treatment, in such cases, would be improper. The same treatment should be adopted in the serous, as in the congestive form of the disease, for where the nature of the affection is the same, the same curative means should

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* [This view had been taken so long ago as 1792, by Dr. Physick, in his Inaugural Thesis, *De Apoplexiâ*, printed at Edinburgh. See Dr. J. R. W. Dunbar's Inaugural Essay on the *Structure, Functions, and Diseases of the Nervous System.* Philadelphia, 1828. — B.]

be employed. Why it is that effusion takes place in one case, and not in another, we cannot tell; such changes are connected with laws of organization, of which we are at present ignorant. We know as little why this should occur as why inflammation of the liver in one case is followed by enlargement, in another by the secretion of pus, in a third by cancer, or in a fourth by hydatids.

We now come to the consideration of apoplexy with extravasation of blood. This is the form of the disease to which the term apoplexy has been restricted by one of the last writers on the subject, M. Rochoux. In this affection, the extravasation of blood, which constitutes the principal pathological feature of the disease, is found to exhibit a remarkable variety as to its seat and extent. In some cases, the blood is effused on the surface of the brain; in others, into its substance; and in a few cases into the ventricles. De Haen gives some cases of apoplexy produced by rupture of the choroid plexus; but in the great majority of cases, where blood is found in the ventricles, the extravasation has taken place in one hemisphere, and, tearing through the substance of the brain, has made its way into their cavities. Of the three varieties of apoplectic effusions, the ventricular is the rarest; the next to this is the meningeal, or that in which blood is poured out on the surface of the brain; and the most common is where it is effused into the substance. It has been also found that certain parts of the brain are much more liable to sanguineous effusions than others; of the reason of this, as of many other phenomena connected with the circulation of the brain, we are still in ignorance. The following table, which you should bear in mind, exhibits a remarkable preponderance in the liability to sanguineous effusions of certain parts of the brain. It has been taken from the "*Précis d'Anatomie Pathologique*" of Andral. The following is a summary of the results of 386 cases of apoplexy.

In 202 cases, the effusion took place into the substance of the hemisphere of the brain, in that part which is on a level with the corpora striata and optic thalami. The portion of the brain next most liable to effusions, are the corpora striata; and here we have 61 cases. Next to this are the optic thalami, in which we have 35 cases. In that proportion of the hemispheres above the centrum ovale, 27 cases. Lateral lobes of the cerebellum, a proportion of 16 cases. In those portions of the brain anterior to the corpus striatum, 10 cases. In the mesocephalon, 9. Spinal cord, 8. Posterior lobes of the brain, 7. Middle lobe of the cerebellum, 5. Peduncles of the brain, 3. Olivary bodies, peduncles of the cerebellum, and pituitary gland, 1 in each, making 3 —Total, 386. Out of these, we find 325 cases occurring in the hemispheres of the brain, corpus striatum, and optic thalamus.

In the number and size of these effusions we find the greatest varieties. In some cases, an enormous effusion takes place, and many ounces are extravasated into the substance of the brain; in others, the quantity is trifling, being sometimes as small as a pea,

or even less. It has been observed that in cases where numerous extravasations were discovered, they were generally found to be in different states, as if they had occurred at intervals, and not simultaneously. This leads us to a knowledge of one of the most important facts in pathology, that in many cases of apoplexy, after a clot has been formed, nature commences, at an early period, a process of cure. This change, which takes place in cases where a patient recovers, seems to be the following: — It becomes, at first, somewhat gelatinous; it is next observed to be more consistent, and it looses its red colour, and takes on a whitish or yellow appearance. The clot is gradually removed; and along with the absorption of the clot there is a process of isolation going on. A fine membranous cyst, furnished with vessels, is formed round the clot. In some cases, the clot is replaced by a quantity of serous or gelatinous fluid; but in the majority of instances this does not occur, and the cyst has been found empty. This is a fact which has been established by numerous observations.

There is the greatest possible difference as to the period at which the absorption of the clot is completed; but we may safely assert, from the number of cases in which, after paralysis, a recovery takes place, that this process is of very common occurrence. In several cases, where apoplexy, followed by paralysis, has happened several times during the lifetime of the patient, a number of those cysts, corresponding with the number of attacks, and presenting various appearances according to the date of their formation, have been found. It appears, then, that the cure of apoplexy depends solely on the absorption of the clot; and that, as long as this remains unabsorbed, the patient is in danger. In some cases, absorption does not take place at all, the clot becomes organized; and in this way it is supposed that some of the tumours found in the brain are formed. There are several circumstances which favour the absorption of the clot, but nothing so powerfully as a healthy condition of the whole cerebral circulation. This leads us to the consideration of the importance of paying attention to the head, long after an attack of apoplexy. It inculcates the necessity of avoiding everything calculated to add to the existing congestion; and shows that, in the paralytic or after-stage of an apoplectic attack, we should not neglect to deplete the head from time to time. The great point is to keep the head perfectly free from irritation; for it has been found, that, where a cure appeared to be going on, any new irritation applied to the brain has had the effect of arresting the absorption of the clot, and marring the process of cure.*

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* [I have known this effect to be caused by the secondary irritation from a distended stomach. The patient, a female in advanced life, was recovering from the first attack, for which active depletion had been used, and rigid abstinence enjoined, when she yielded either to evil appetite, or to evil suggestion of another, and ate heartily of strong, gross food. It was her last meal. — B.]

I regret I cannot dwell longer on this subject, as I wish to conclude the pathology of apoplexy to-day. There are, however, two more observations to be made before I close the subject. The source of an apoplectic effusion is very hard to be discovered; it appears generally to come from a number of minute vessels, for we are seldom or never able to trace it to the rupture of a vessel of any size. The age at which persons are most subject to apoplexy, appears to be from fifty to seventy. You should, however, be aware that apoplexy with sanguineous effusion is by no means uncommon, even in persons of a tender age. Billard details an instance of this in a child, soon after birth. There are also several cases mentioned as occurring in children during the first three or four years. Andral gives the case of a boy, of nine years of age, who died of apoplexy, with a vast effusion of blood. One of the most remarkable cases of this kind I ever witnessed, occurred in a child who had been just weaned. This child had been labouring for some time under symptoms resembling incipient hydrocephalus, and then suddenly got an attack of convulsions, followed by coma and paralysis of one side. From a careful study of the symptoms, I ventured to make the diagnosis of apoplectic effusion, and on examining the brain, after death, there were nearly three ounces of blood found effused in the base of the brain.

LECTURE LXXXVIII.

Apoplectic Effusions—Curative process adopted by nature—Periods of life most subject to apoplexy—Connection of temperaments [and sex] with disposition to apoplexy—Researches of Rochoux—Principles of diagnosis—Varieties of apoplexy—Connection of symptoms with pathological appearances—Rostan's division of—Different symptoms of—Double effusions—Rupture into the ventricles—Hemiplegia—Value of the suddenness of paralysis as a diagnostic examined—Symptoms of apoplectic effusions.

At my last lecture, I spoke of the nature of apoplectic effusions; I stated that they exhibited a considerable variety as to their situation, extent, number, and condition in different cases; that it was frequently a matter of great difficulty to ascertain their source, and that they might occur at any age, but chiefly from that of fifty to seventy. I gave a brief sketch of the process adopted by nature in effecting a cure, and showed that in many cases, where the effused blood is absorbed, there is scarcely any trace of the disease, except a slight cicatrix; but that in some instances, where the sanguineous effusion has been removed, its place becomes occupied by a quantity of serous fluid, and this, with the cyst which contains it, seems to explain what the old anatomists termed *false ventricles*. You will find, by looking over some of the earlier writers on anatomy, that they have described the brain as containing more than the ordinary number of ventricles, and the mistake seems to have arisen from their taking for ventricles those serous cysts or cavities which remained after the absorption of an apoplectic effusion. Of

course other causes, such as congenital formation, may give rise to the appearance. You will see in the Museum of the College of Surgeons a fine specimen of abnormal cavities filled with serum in different parts of the brain.

In speaking of the period of life at which apoplectic disease is most frequent, I stated, that though it might occur at any time of life, still there was a particular period at which there is a greater liability than any other. Rochoux has shown that the tendency to apoplexy is greatest towards sixty, and diminishes towards seventy years of age. The number of cases which occur between sixty and seventy are very great, when compared with those between seventy and eighty; and after eighty he considers the liability to be still farther diminished. It seems strange, that persons after seventy should not be so liable to attacks of apoplexy as before that period, but such is the fact. It has been thought that this may be explained by the anæmic state of the brain in old persons; it is said, that at such an advanced age general emaciation takes place, and the quantity of blood is greatly diminished. This explanation, however, is doubtful, because it is at present well ascertained, that persons of ordinary development, who are neither fat nor thin, and also persons of spare and delicate habit, are as much, and even more, liable to apoplexy than the fat and plethoric. It has been ascertained by careful investigations, that a high degree of plethora does not necessarily predispose to the disease, and that it is oftener met with in persons not of a plethoric habit than in those who are. These considerations throw some doubt on the opinion that an exemption from apoplectic attacks is connected with an anæmic condition of the system. It generally happens, however, that at this advanced period of life, from the general debility of the system and the incapacity for active exertion, a man ceases to employ his thoughts about business, and there is little exercise for the intellectual functions. We now have finished the task; the brain reposes from the turmoil of active and incessant thought; there is a comparative absence of mental exertion, and this may in some degree account for the rarity of apoplexy after the age of seventy.*

With respect to the different temperaments as bearing on this

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* [Of 69 cases recorded by Rochoux, the distribution, in respect to age, was as follows:—

From 20 to 30 years,	. . . . .	2	cases.
" 30 to 40 "	. . . . .	10	"
" 40 to 50 "	. . . . .	7	"
" 50 to 60 "	. . . . .	13	"
" 60 to 70 "	. . . . .	24	"
" 70 to 80 "	. . . . .	12	"
" 80 to 90 "	. . . . .	1	"
		69	—B.]

point, Rochoux shows that in Paris, at least, there was a nearly equal frequency of the disease in individuals of the sanguine, sanguineo-bilious, and sanguineo-lymphatic constitutions. The bilious temperaments, however, are much less liable. Such is the result of the observations in Paris; but it must be recollected, as Rochoux observes, that in that city the bilious temperament is the rarest. With respect to the sanguine or plethoric, it has been found that this temperament does not predispose to apoplexy so much as has been generally supposed. The disease has been observed to be most common in persons of ordinary development, next to those in persons of thin, spare habit, *and last of all in the plethoric and fat.* Rochoux's researches lead him to conclude that the number of persons of ordinary development, attacked by apoplexy, is three times that of the plethoric, and that that of the spare habits is little more than twice as great as that of the fat and plethoric. If these researches are correct, they afford great consolation to stout gentlemen.

The conclusion, which has been come to, with respect to temperaments as bearing on the liability to apoplexy, appears to be true, namely, that there is no sign appreciable by the senses which will unequivocally point out a predisposition to apoplexy. This is of great importance in a practical point of view. You may expect the disease in the fair or dark-haired, the thin or fat, alike. The frequent occurrence of this disease in persons who were never suspected to have any predisposition to it is another proof in favour of this opinion. With respect to the mere medical diagnosis of apoplectic effusion, it would be well if, in making it, you would always bear in mind the anatomical characters of the disease. Extravasation of blood into the substance of the brain generally takes place by a tearing or separating of the cerebral tissue. A quantity of blood is rapidly effused, the substance of the brain torn, and a cavity formed. There can be no doubt that the tissue of the brain is torn, for we can see the loose shreds hanging on each side of the cavity, and mixed up with the clot. Now, what are the principles which should guide us in making our diagnosis? They are exactly the same as those in other diseases *connected with a sudden solution of continuity in the substance of internal organs.* We have, with or without any preceding symptoms of a different kind, the *sudden* supervention of new and remarkable phenomena. The phenomena which are the result of disease proceeding in its ordinary course are gradual and progressive; but occurrences of this kind are almost always characterized by sudden and well-defined symptoms. Thus, we make the diagnosis of the rupture of an aneurism of the aorta from the sudden vomiting or expectoration of blood, followed by the death of the patient. Here, you perceive, the diagnosis is founded on the sudden supervention of new symptoms. In the same way we make the diagnosis of pneumothorax with a fistulous opening communicating with the bronchial tubes, and calculate, from the sudden occurrence of pain in the side and the

other signs of pneumothorax, that there has been a solution of continuity in the pleura. Again; if a person labouring under hepatic abscess is seized with a fit of coughing, and suddenly expectorates a quantity of pus, and that this is found to be accompanied by a subsidence of the tumour in the region of the liver, we make the diagnosis of perforation of the diaphragm and pleura, and the escape of the contents of the abscess into the substance of the lung. Or he may, under the same circumstances, be seized with sudden and rapid peritonitis, and here we make the diagnosis of an effusion into the peritoneum. It is on precisely the same principles that Louis has established the diagnosis of perforation of the small intestines in cases of gastro-enteritis. The patient is lying in bed, perhaps apparently improving; he is not exposed to any exciting cause, and every care may have been taken of him. *On a sudden* he exhibits symptoms of intense peritonitis, and rapidly dies. Any one conversant with such cases can easily make a correct diagnosis. On the same principles we found the diagnosis of apoplectic effusion. Almost all the instances of disease which I have given occur with a *sudden* violent invasion; and the same thing may be said of apoplexy with extravasation. It is true, that there are some cases which do not exhibit this character, but the general rule is suddenness of attack.*

We may divide apoplectic attacks accompanied by extravasation into three great classes; and, if you look to the great majority of cases of this disease, you will find that, although they appear to pass by insensible degrees into one another, still, when taken and examined singly, there will be found a difference between them. This classification is that of Rostan, and I have known his principles verified in many instances. In the first class of cases, which are the worst and generally prove fatal, the extravasation is enormous. A person, apparently in perfect health, will fall down in a fit of apoplexy, remain for a short time insensible and paralytic, and then die. In such a case as this, the ordinary pathological character is an enormous effusion of blood, or excessive congestion. In a case of the second class, we have an apoplectic seizure with coma, which disappears after some time, and the patient recovers his intelligence, *but with paralysis of one side.* The pathological character of this form is, that the effusion is more limited, and exists only on one side of the brain. Neither is the congestion so severe, and the patient recovers from the coma. In the third form,

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* [As regards the predisposition to apoplexy dependent on sex, we find that more men than women are attacked with the disease. P. Frank shows that, out of 1241 cases of fatal apoplexy in the hospital at Vienna, during the period between 1787 and 1804, there were 637 men and 604 women. M. Fabret, in his statistics of apoplexy, indicates a greater difference. Thus, out of 2297 cases of the disease, there were 1670 men and 627 women. — B.]

we have an attack of apoplexy of a milder description; there is scarcely any coma or loss of intelligence, and the paralysis is slight, generally affecting the muscles of one side of the face or of one of the extremities. Let us repeat these varieties. In the first, which constitutes the *apoplexie foudroyante* of the French, there is an enormous extravasation of blood in both sides of the brain; or, if it be only on one side, the amount of the effusion is frequently such as to burst through the walls of the ventricles and get into their cavities, and in this way we may have an effusion of one side getting into the other hemisphere, or exercising such pressure on it as may give rise to *general* symptoms. Such a case as this is, I believe, generally fatal; its progress, too, is very rapid, several persons under such circumstances having died in the space of an hour or less. In the second form, there is coma and loss of intelligence, and the patient recovers *with paralysis of one side.* Here the extravasation is never so great as in the foregoing case; the effused blood is confined to one side, and does not get into the ventricles. In the third form, the effusion is very much circumscribed, the signs of general congestion or extravasation are slight, the quantity of blood poured out is not, perhaps, larger than a nut, it is followed by partial paralysis, and there is little or no coma or loss of intelligence.

Let us take a brief review of the symptoms which attend each of these forms. In a case of the first description, we find a person, hitherto in the enjoyment of health, suddenly attacked with symptoms of intense apoplexy. You will recollect that in my last lecture, I told you that apoplexy consisted in various lesions of the phenomena of the life of relation. In the most violent form of apoplexy, many authors are of opinion that there is a total paralysis in the functions of animal life. The patient falls down and remains in a state of complete insensibility, the eye no longer obeys the stimulus of light, no sound makes any impression on the ear, of odour on the sense of smelling, the sense of taste is destroyed, the skin may now be seared with a red hot iron without the slightest indication of suffering; in fact, sensation, one of the great phenomena of animal life, appears to be annihilated. If we examine further, we find that there is a total suspension of the intellectual functions, and that the patient is unconscious of anything passing around him. If we go to the muscular system, we find that all that part of it which subserves to the purposes of animal life is completely paralysed. The neck, trunk and extremities have lost their power; and, if you raise the head, trunk, or one of the limbs, they fall down like dead masses, as soon as the support is withdrawn. In some cases there is a certain degree of rigidity in the muscular system, in others not. We may observe also, that from the paralysis of the buccinators, the cheeks are alternately puffed out and sucked in during respiration. As far as my experience goes, I believe that this symptom is fatal. Here, then, we see that

the great phenomena of the life of relation are suspended. The functions of organic life, however, still continue to be performed, the heart beats, respiration goes on, and the power of secretion remains; but, after some time, the functions of organic life are also suspended, and the patient dies. In some of these cases, we observe evident signs of determination of blood to the head, the face is swollen, and the lips livid; there is considerable turgescence of the vessels of the neck, with heat of the head, the skin hot, and the pulse full and strong. In other cases, however, we have a feeble pulse and a cold collapsed state of the surface.

Let us now turn for a moment to the pathology of this form of the disease. I have already mentioned, that the extravasation sometimes occupies both hemispheres of the brain, or that it occurs on one side, and, by tearing through the substance of the brain, gets into the ventricles, and produces symptoms referrible to a lesion of both sides. With respect to the simultaneous double effusion, the following is a short notice of some cases taken from the "*Clinique Médicale*" of M. Andral. A man, about thirty-seven years of age, fell down near La Charité in a fit of apoplexy. He was immediately brought into the hospital, had prompt and careful attention paid to him, but without any effect; he lay in a state of profound coma, with complete suspension of the phenomena of animal life, and died in an hour and a half. On examination there was a double effusion of blood found in the brain, but it had not got into the ventricles. In another case, marked by simple intensity, there was an enormous effusion discovered in the substance of one hemisphere, which burst into the ventricle, tore through the septum lucidum, and passed into the ventricle of the opposite side. In the next case, no distinct trace of optic thalamus or corpus striatum could be seen, their substance being completely broken up and destroyed by the effusion. I have told you that, after a rupture of the substance of the brain and the escape of the effused blood into the ventricles, persons have not recovered, but it is a fact, and a consolatory one indeed, that a person may recover from a *simultaneous double effusion*. A case in proof of this is given by Andral. A female who had been for some time a patient at La Charité, died of cancer of the stomach. The history of her case was, that nine years before she had an attack of apoplexy, she had fallen down in a state of insensibility, and remained comatose for a considerable time, that this was followed by *paralysis of both sides of the body*, which continued for two years, after which she gradually recovered the use of her limbs. In this case, two serous cysts, such as are met with in cases where patients have recovered from apoplectic attacks, were found, one in each hemisphere of the brain. In another case, the subject of which died of visceral disease, the patient had twenty-two years before an attack of apoplexy with double paralysis, and recovered with the loss of the use of one side; here there were two cysts also found. It appears, then, that

though extravasation, with rupture of the walls of the ventricles, and escape of blood into their cavities, always proves fatal, a recovery may take place after a simultaneous double effusion.

Let us now inquire briefly, whether an apoplectic attack, followed by paralysis of both sides of the body, gives sufficient grounds to enable us to make the diagnosis of either of these accidents. Does it follow, if a person has an attack of apoplexy, succeeded by paralysis of both sides, that the effused blood has burst into the ventricles, or that a simultaneous double effusion has occurred? Andral inclines to this opinion as far as I can collect. Dr. Abercrombie appears to differ from him, and gives cases in illustration of his opinions. The following is one: — A private of the 10th Hussars has been complaining for some time of a pain in the head, for which he was blistered, and the pain soon went off. On the 22d of July, 1819, he was seized with giddiness and fell down; on being raised, he vomited, and complained of violent headache and faintness, but was quite sensible. He was very pale, and his pulse slow and languid. He was brought into the hospital, where he asked for some cold water, made a few inspirations, and expired. From the moment of his last seizure he had been paralytic of both extremities. Here we have an attack resembling the first form of apoplexy, so far as complete loss of power in the upper and lower extremities is concerned, but observe, the *patient was not comatose, and retained his faculties to the last.* On examination there was nothing found amiss with the brain, but, on removing the cerebellum, a coagulum to the amount of about two ounces was found under and surrounding the foramen magnum. Here the paralysis appears to have been produced by the pressure of the effused blood on the upper part of the spinal cord. This case is an interesting one. It appears that the injury done to the functions of the life of relation was partial, there was a lesion of the muscular function, but there was no coma, and the intellectual faculties were unimpaired. As far then as a single case goes, we may come to the conclusion, that we are not to make the diagnosis of the first form of apoplexy, unless, in addition to the double paralysis, there are coma and loss of intelligence and sensation. The great points of diagnosis are coma, suspension of the phenomena of the mind, and paralysis of both sides of the body, both of motion and sensation. We now come to consider the symptoms of the second or milder form of the disease. A person falls down in a state of insensibility, but when you come to examine him, you find that the coma is not so profound, nor is the paralysis and loss of sensation so complete. The eyes are to a certain degree susceptible of the impressions of light, signs of uneasiness are exhibited when strong pungent odours are applied to the nostrils, and indications of suffering are given if you pinch or burn the skin. All these circumstances prove, that the paralysis of sensation is by no means so complete in this as in the former case. You observe here, too, that instead of the cheeks being pulled out in the manner before described, there is only a partial paralysis of the muscles of

the face, *and the mouth is drawn towards the sound side.* The patient, too, instead of dying in a comatose state, gradually regains his intelligence, and is only paralysed on one side, or one extremity. All these circumstances point out that the injury done to the brain is not so extensive, and the occurrence of paralysis on one side shows that the effusion is limited to a single hemisphere of the brain. All this, too, is borne out by pathological anatomy, which shows us, in the first place, that the extent of the effusion is much less, that it exists only on one side of the brain, and never bursts into the ventricles. The general congestion of the head also is much less, than in the former case. In the third form, the congestion and other symptoms are sometimes very slight. A person in health may feel a stunning sensation in the head, followed by some thickness of speech and drawing of the mouth to one side, or slight paralysis of one arm or hand, but he has no coma or loss of intelligence, and the paralysis quickly disappears. Everything connected with the attack shows that it is very slight, the effusion is extremely limited, and this is confirmed by pathological anatomy.

I have now given you a brief sketch of the three varieties of apoplexy; between these you will meet with many intermediate cases.

Let us inquire how far does the circumstance of paralysis point out the occurrence of an extravasation of blood into the substance, or on the surface of the brain; that is, how far we can say that this patient has effusion, because he has become suddenly paralytic. It would appear, that the mere suddenness of the attack will not alone lead to the formation of a certain and accurate diagnosis. You will find in various authors many instances of affections of the head, not of an apoplectic character, in which there was sudden paralysis. Thus, for instance, there are many cases of tumours and encysted abscesses on record in which there was sudden paralysis, and where, if you should pronounce the disease to be apoplexy, you would be certainly wrong. We had lately, at the Meath Hospital, a remarkable instance of this. A patient, who had been for a considerable time labouring under aneurism of the innominata, in the course of the night became suddenly hemiplegic. On examining the brain, *post mortem*, there was a circumscribed abscess found in one of the hemispheres, but no sanguineous effusion. If you look to the works of Abercrombie, Rostan, Lallemand, &c., you will find many cases detailed in which sudden paralysis occurred from other causes than apoplexy.

But are there no circumstances, which, combined with the suddenness of the attack, would lead us to form the diagnosis of apoplexy? Now, it would appear that, as a diagnostic of apoplectic effusion, *suddenness of paralysis* is only to be relied on where there have been no premonitory symptoms of a local disease of the brain. In the great majority of cases of cerebral abscess, you will find that pains and cramps in some of the limbs, and pain of the head in the situation of the abscess, have preceded for some time

the paralytic attack. But if a person in health, without any of these cramps or pains, gets a *sudden* attack of apoplexy, and becomes hemiplegic, you may make the diagnosis of apoplectic effusion with tolerable certainty. The fact of the paralysis occurring with an apoplectic seizure, renders it highly probable that the case is really one of the hemorrhagic diseases of the brain. On the other hand, it is true that we may have apoplectic effusions ushered in by symptoms of irritation of the brain; as in the case of an apoplectic effusion occurring in the centre of a softening of the brain. The absence, therefore, of these premonitory symptoms appears to be necessary towards forming the diagnosis of simple apoplectic effusion.*

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* [As the phenomena of apoplexy, at least so far as regards the loss of consciousness and of motion and the stertorous breathing, may proceed from other causes than fulness and congestion of the cerebral vessels and general plethora, the *Observations on the Prevention and Treatment of Apoplexy and Hemiplegia*, read by Dr. Marshall Hall at a meeting of the Medical Society of London, April 4, 1842, come in opportunely in illustration of this subject. I have not room for the whole paper, but will give some passages. Dr. Hall says: —

The question of the causes, nature, prevention, and treatment of apoplexy and hemiplegia was a very complicated one. He thought the attention of physicians, in reference to the prevention and treatment of apoplectic and hemiplegic attacks, had been far too much confined to the question of plethora as the disease, and of depletion as the remedy. It was to him certain that such attacks might and did occur quite irrespective of general plethora; nay, that they occurred in connection with the opposite condition of the system, that of inanition and anæmia. Nor was a state of anæmia the only other condition besides plethora which led to the apoplectic or hemiplegic attack. Morbid conditions of the stomach and morbid conditions of the intestines were other sources of these seizures. But he had also observed the occurrence of apoplectic affections under other circumstances: other indubitably predisposing causes of the apoplectic seizure were dyspepsia, cachexia, and gout. Nor was even this view of the subject sufficiently extended; the liver and the kidney must do their office. These sources of the apoplectic or hemiplegic seizure consisted in conditions of the general circulatory system, and of the blood itself. There were still others of a different kind.

The first of these was disease of the heart; and this consisted, first, in hypertrophy, with augmented impulse given to the arterial blood; or, second, in dilatation of the heart and disease of its valves, impeding the reflux of the blood along the veins.

The second was disease of the capillary vessels, of the minute arteries, or of the minute veins of the brain and its membranes.

Lastly, there were causes of apoplexy in the muscular efforts, by which the action of the heart itself was augmented, as in violent running, the ascent of a mountain, &c., and in other muscular efforts, by which the return of venous blood was impeded, as the efforts of vomiting, or for the expulsion of the feces; and still more, of parturition.

This view of the causes of apoplexy would sufficiently denote the complexity of the problem of the prevention and treatment of the apoplectic and hemiplegic attack; for that prevention depended on restoring the system to a state of what may be termed equilibrium, in regard to plethora and inanition; to the removal of irritating or morbid matters from the primæ viæ; to the correction of the morbid diathesis in dyspepsia, gout, and cachexia. The prescription must include remedies and regimen to meet all these circumstances, and, as he had stated, the problem was by no means either an easy or a simple one. Yet another element in the problem was that which related to the local or topical remedies. On each of these sources of the apoplectic and hemiplegic attack, he proposed to make a few observations. These observations would be principally addressed to the medical practitioner; but as far as they might relate to regimen, they might, he thought, be profitably considered by the patient.

Of Inanition. — It was constantly his lot to see patients who were in jeopardy not from fulness but from inanition, and who had long been kept in a state of anæmia by bloodletting, general or topical, when an opposite treatment was required to restore the equilibrium of the system, and to remove the vertigo and other symptoms threatening an attack of apoplexy. A state of pallor, a disposition to faintishness, palpitation and nervous timidity, the occurrence of the symptoms when the stomach was empty, when the bowels had been relieved, and on suddenly looking upwards, or resuming the upright position on rising from bed, or after stooping, or the recumbent position: such were the diagnostic *signs* of a state of inanition from a state of plethora. The *history* of the case also afforded a diagnosis; for, although depletion might have appeared to afford a momentary *relief* of the symptoms, it had issued in their *aggravation* in general. An opposite mode of treatment, very cautiously and prudently adopted and pursued, would confirm the diagnosis, by affording a more permanent, though possibly a less immediate and marked relief. It was to the important distinction between the immediate and permanent relief, indeed, that he would draw the attention of the profession. In the case of symptoms portending apoplexy or hemiplegia, although these might arise from inanition, yet they were invariably *relieved* by depletion, although they afterwards returned with augmented force. This effect was very puzzling to the inexperienced practitioner. It was explained by the fact, that the symptoms ceased under the influence of a condition allied to syncope, but returned with the reaction. This subject must be carefully studied, in order that the nature and

treatment of the case might be understood. He had next particularly to notice that the state of anæmia was not one of safety. In such circumstances apoplexy and hemiplegia, with the actual effusion of blood into the cerebrum, had occurred.

Of Dyspepsia and Cachexia. — There could be little doubt that in dyspepsia the blood itself became contaminated, and, as it were, *cachectic;* on this principle we accounted for the appearance of furunculus and paronychia; for the morbid condition of the tongue and interior of the mouth, the general cutaneous surface, the secretions, &c. He had so often observed symptoms threatening the apoplectic or hemiplegic attack, in conjunction with symptoms of dyspepsia and cachexia, that he had no doubt of the vast importance of a strict attention to this subject. That very day (Oct. 1, 1841,) he had been consulted by a medical gentleman from Birmingham under these circumstances. One form of this affection was the following: vertigo occurred with faintishness, sickishness, and a cold clammy perspiration; sometimes there was actual sickness, sometimes much flatus. In these cases the feet and other extreme parts were apt to be cold. The secretion of the liver was frequently defective, and the urine was apt to deposit the lithic acid salts. Nothing could be so injurious as bloodletting. In no case was the loss of blood repaired with such difficulty. The application of a few leeches frequently left a state of debility and pallor which were felt and seen for weeks. The treatment consisted in the correction of the secretions, and in the infusion of tone and general health into the system. The compound decoction of aloes, the infusion of rhubarb, of gentian, of cinchona, singly, or, better, mixed together; sarsaparilla; the vinum ferri; the bicarbonate of potass, stomachics, tonics, and antacids, in a word, were the principal internal remedies. But with these a mild, nutritious diet, a system of gentle exercises, early hours, the tepid salt-water shower-bath, and a strict attention to the condition of the feet and general surface, by means of the flesh-brush, flannel, and a frequent change of shoes and stockings, should be conjoined. Those engaged in the harassing affairs of a London life should sleep in the country, and cherish the utmost quiet of mind.

Of Gout. — But he had frequently traced a connexion between gout and its frequent attendant, the lithic acid diathesis, and the apoplectic and hemiplegic seizure. It was not merely plethora, or the opposite state of inanition, which led to the apoplectic attack. The morbid state of the blood in dyspepsia and cachexia also disposes, as he had already said, to this affection. The same remark applied to the condition of the system and of the blood, especially in gout; and, as he should have to observe immediately, the same disposition obtained in several morbid conditions of the liver and kidney. A nobleman, now no more, suffered in succession from gout and the herpes zoster, and the urine deposited the lithites copiously. He was relieved by the appropriate remedies, and became affected with an apoplectic (or epileptic) attack. A similar attack (without

hemiplegia) occurred several months afterwards, and a third attack proved fatal. This gentleman was pallid, the prolabium being white. A steady perseverance in such remedies as the dococtium aloes compositum, the bicarbonate of potass, and the vinum ferri, had in other cases effectually averted the threatened evil. But he must make another remark. The vinum colchici should be given in very minute doses, as five drops thrice a-day, also steadily and persevering to overcome the specific gouty diathesis. The lithic acid diathesis was not the only urinary disorder which led to apoplexy and hemiplegia. This attack, it is well known, occurs in the case of diabetes and in that of albuminous urine. Although he had designated the attack apoplectic and hemiplegic, it was sometimes more allied to epilepsy than apoplexy. The gentleman to whose case he had briefly adverted, was affected with minute ecchymosed spots on the forehead, which he had only observed under three circumstances, viz., after severe vomiting, the effects of parturition, and the epileptic attack; when he saw him soon after the second seizure, the insensibility had passed away, and there was no hemiplegia.

Of Muscular Efforts. — He might make the same remark in regard to muscular efforts, which he had done in regard to disease of the heart — those efforts which opposed resistance to the reflux of the venous blood, were much more efficient causes of the apoplectic seizure than those efforts which augmented the momentum of the arterial blood. Thus we rarely heard of the occurrence of apoplexy during the violence of the race, during the ascent of mountains, &c., but such an occurrence at the water-closet was by no means uncommon; and we all know how apt the parturient efforts were to induce congestion of the brain, and the consequent apoplectic seizure. It would be most interesting to correct our ideas on these subjects by a cautious appeal to facts. — B.]

LECTURE LXXXIX.

Apoplexy from *ramollissement* (softening) of the brain—Supervention of apoplexy on encephalitis—Inflammation round the clot—Variety of paralysis consequent on apoplexy—Paralysis croissée—Different forms of paralysis—Origin—Phenomena of face and tongue—Paralysis of the tongue—Treatment of apoplexy—Bloodletting—Purgatives—Lotions, beneficial effects of—Emetics, dangerous effects of—Use of revulsives and stimulants—Treatment of paralysis—Efficacy of strychnine—Its modus operandi—Brucine, its proposed employment.

I left off at my last lecture in considering how far the mere circumstance of suddenness of attack with paralysis could be considered as leading to the diagnosis of apoplectic effusion, and endeavoured to show that mere suddenness of attack with paralysis was insufficient to form a diagnosis, except where they occurred in a person who had no previous symptoms of irritation of

the brain; — these symptoms being pain of the head, and pains, spasms, and rigidity of the limbs. I wish to impress upon you that you may have an attack of apoplexy with effusion ushered in by all these symptoms, particularly in cases where the apoplectic effusion is consequent on a localised inflammation of the brain. A portion of the brain, for instance, becomes inflamed and disorganized; local *ramollissement* (softening) takes place; and it may happen that this, acting as a point of attraction to the fluids, may lead to the occurrence of an apoplectic effusion in the originally affected portion; and in this way you will have apoplexy preceded by all the symptoms which characterize a partial encephalitis. You will perceive, then, that the absence of these premonitory symptoms is necessary towards forming a *certain* diagnosis of apoplexy with effusion. If these symptoms have preceded the attack, it is probably either circumscribed abscess of the brain, or it is local inflammation followed by effusion. Between these two forms of disease we have no means of distinguishing.

Before I speak of paralysis I wish to make some remarks on a condition of the brain which supervenes in certain cases of apoplexy. In cases where absorption of the clot takes place, we cannot suppose that any inflammatory condition of the brain exists; on the contrary, we have every reason to believe that a non-inflammatory condition of the brain is highly favourable to this process, for whenever anything of an opposite character happens, we find that it prevents absorption. But sometimes cases occur, in which, at an earlier or later period, inflammation is set up round the clot. Now, what happens in many of these cases? Here let me repeat, that there are many exceptions to the rules given for forming the diagnosis of disease of the brain; the variety in the symptoms of cerebral affections being so great, that it is sometimes difficult to deduce from them rules of general application. In most cases we have apoplexy followed by paralysis with resolution; but, in cases where inflammation takes place round the clot, it has been observed that the paralysed limb which had been previously in a state of resolution becomes contracted, and then we have paralysis with contraction. This contraction generally comes on in a gradual manner, but when the case is severe, it is frequently ushered in by violent spasmodic action of the affected limbs. We have, then, the following order of phenomena; first, paralysis with resolution, and then paralysis with contraction. In circumscribed inflammation of the brain, the phenomena are the reverse of these; we have, first, rigidity and contraction of the limbs, and then symptoms of apoplexy followed by paralysis with resolution.

With respect to the paralysis which is consequent on an attack of apoplexy, there is the greatest possible variety. In some cases there seems to be paralysis of all, or almost all, of the muscles of animal life; in others, it affects only the muscles of one side of the body. A rare and extraordinary form of paralysis has been described by the French writers, who have given it the name of *para-*

lysis croissée. In this form of the disease there is an affection of both sides, but not of the symmetrical members; we find the left arm and the right leg paralysed, and *vice versâ.* This is an unusual form, in fact the rarest to be met with in practice. We may also have great varieties in the amount of the paralysis; in some cases both sides being affected, in others only one, while in others there is only a single extremity or one side of the face paralysed. We may also have complete paralysis of one side without any affection of the face. I remember a remarkable case of this kind, of which I shall give you an abstract. A gentleman, of stout muscular habit and a strong full pulse, had been suffering for a long time under an obstinate gouty affection. From a reputation of the gouty attacks he got a chronic swelled state of the lower extremities, which continued for some time, he being in other respects in the enjoyment of excellent health. The swelling, however, preventing him from taking his usual exercise, he applied for advice. Laced stockings were advised, the effect of which was, that the œdema subsided, and the motion of the lower extremities was restored. It is curious that, between the period of the removal of the œdema and the paralytic attack which I am about to describe, this gentleman enjoyed excellent health. At the end of that time, on attempting to go over a step that led into the yard, he found he could not accomplish his purpose, and struck his foot against the stone. He immediately became alarmed and sat down, and soon after found that he had lost the power of using his arm. I saw him in a short time after the accident, and found that there was complete paralysis of the arm and leg, but no distortion of the face or tongue, or the slightest lesion of intelligence. He continued in this state for some time, and then recovered, but it was necessary to take a large quantity of blood from him. In the first bleeding, as the pulse was full and bounding, I took sixty ounces of blood from the arm, and I think it was owing to the activity of the measures adopted that he recovered so speedily. I mention the case merely to show that we may have paralysis of the leg and arm, without any affection of the face, or loss of intelligence. In some cases we find the paralysis affecting the tongue, face, and muscles of the eyelids; in some we have paralysis of the sphincter ani, or of the muscles of deglutition, or of the bladder, but these are rare, and the most ordinary form is paralysis of the muscles of one side, and distortion of the face. There is another circumstance, which seems to be so exceedingly frequent as to form a law, perhaps the most general of any in medicine, that paralysis occurs on the side of the body which is opposite to that on which the effusion occurs. If you have an effusion into the right hemisphere, you will have paralysis of the left side of the body, and, if the effusion be on the left side, the paralysis will be on the right. To this rule, however, it has been stated that there have been a few exceptions; how they have occurred it is totally impossible to explain; it is sufficient for us to know that such exceptions have been witnessed. Cases of

this description have been very rarely seen since pathological anatomy has been studied with more diligence; it is however true, that a few have been detailed by men of great professional eminence. We want facts to throw light on this point, and, until this is accomplished, we must remain in ignorance of the cause of the anomaly. In the vast majority of instances, the paralysis is on the opposite side to that on which the effusion takes place, and this appears to be explained by the decussation of the fibres of the brain at the upper part of the spinal marrow, the fibres of the left side passing to the right, and *vice versâ*. It is an interesting fact connected with this subject, that the muscles of the face follow the same law as the muscles of the extremities, and yet it is a fact, as you are well aware, that the nerves which supply the muscles of the face come off before the decussation of the fibres of the brain takes place. The fifth nerve, which supplies the face with muscular branches, is given off at a considerable distance from the decussation of these fibres, and yet we perceive that the muscles to which it is distributed obey the same law as those which derive their nerves from the spinal cord. Now, if this decussation was the only cause of the paralytic symptoms being observed on the side opposite to that in which the effusion occurs, the muscles of the face should be an exception to this law; but we find that they correspond with other parts of the muscular system in this respect. Thus, if a man gets an attack of apoplexy, followed by paralysis of the left arm, we find the left side of the face affected, and *vice versâ*. We must conclude from this, that the mere decussation of the fibres is not the sole cause of this peculiarity, and must look for an explanation elsewhere, by referring it to the intimate communication which exists between both sides of the brain by means of its commissures. Many persons are not familiar with the phenomena of the face and tongue in paralysis; they are, however, simple and easily explained. Let this diagram represent the head — here we have the right hemisphere of the brain, here the left. Now, suppose you have an apoplectic effusion in the right hemisphere, the consequence is that you have paralysis of the left side of the body, according to the law already mentioned. What will then happen with respect to the face is, that the muscles of the left side being paralysed, and their antagonism destroyed, the mouth is drawn by the sound muscles of the opposite side from the paralysed side, and this is invariably the case. Recollect, then, that the mouth is always drawn from the paralysed side, and towards that side where the disease exists in the brain. But when you desire the patient to put out his tongue, do you find that the tongue follows the direction of the mouth? No; it goes towards the opposite side. This appears somewhat paradoxical at first, but is easily explained. The protrusion of the tongue is effected by the action of the genio-hyoglossi muscles, which are, as you all know, a pair of fan-shaped muscles, attached to the inside of the chin, the middle line of the tongue, and the body of the os hyoides. This diagram will repre-

sent it. Here is the muscle of the left side, and here is the right. When the patient puts out his tongue, this left half being paralysed, and having lost its antagonism, the tongue obeys the action of this, the right half, and the fixed point of attachment of the muscle being to the right of the mesial line, the base of the tongue is brought forward, and to the right, and its point consequently deviates to the left or paralysed side. It has been remarked, also, that there is some variety with respect to the paralysis of the tongue; some patients can protrude it, others cannot. In some cases, too, the patient can put out his tongue well enough, but he cannot employ it in the articulation of sounds, and his speech is quite indistinct.

I might occupy your time for several lectures with these subjects; and, did my time permit, I could lay before you a vast quantity of interesting matter on the subject of paralysis from apoplexy; but, as the number of lectures is limited, all I can hope to accomplish is, to point out the great landmarks to you, and leave the rest to your own study and experience. With respect to paralysis of the extremities, the upper are paralysed more frequently than the lower; and, when both extremities are engaged, the upper are generally more completely affected than the lower. When a person recovers, also, we find that the lower extremities are the first to regain their lost power and sensibility. These circumstances have been attempted to be explained by considering the particular parts of the brain in which the effusion has occurred; but, as this has not as yet been sufficiently made out, I shall pass it over. I regret, also, that I have not time to enter into the subject of the different varieties of lesion of intelligence in cases of apoplexy. I must however observe that the varieties are infinite, and your trouble will be amply repaid by reading what has been written on this point by Dr. Abercrombie, and Dr. Cooke in his Treatise on Nervous Diseases. You will find in the latter work an extraordinary collection of facts with respect to lesions of the intellectual functions.

I shall now endeavour to get through the treatment of apoplexy as briefly as the important nature of the subject will admit. I shall commence by saying, in the words of Dr. Abercrombie, that the remedies for apoplexy are few and simple. The great point is to relieve the head from the accumulation of blood, to prevent further congestion, and to obviate inflammatory action; and for these purposes the only efficient means we possess is bleeding. There is no disease in which the efficacy of free and bold depletion by the lancet is more remarkable than in apoplexy. I agree completely with Dr. Abercrombie in thinking that the symptoms which denote serous apoplexy by no means contraindicate the use of the lancet; for I have already shown, that serous apoplexy was nothing but congestion, that the serous effusion was one of the consequences of this congestion, and by no means the cause of the apoplectic symptoms. Dr. Abercrombie thinks that, in the commencement of the disease,

you may bleed where the pulse is feeble as well as where it is strong and full, and gives many important cases in which the disease yielded to a copious abstraction of blood, though the state of the patient's pulse and general system at the time were such as would deter many from bleeding. He gives three cases of persons about seventy years of age, on whom this mode of treatment was practised with success, and another of a person of spare habit, aged eighty years, whose life was saved by a bold and timely use of the lancet. There is also another case detailed of a patient who was worn down and dropsical at the time of the attack, and received considerable relief from bleeding. I do not wish you to conclude from this that you should bleed as boldly in the one case as in another; what I wish to impress is this, that in a vast majority of cases it is advisable to have recourse to the lancet. With respect to the first bleeding, I think that where the pulse is full and strong it should be large, and such as will produce some effect on the symptoms. This may be repeated afterwards to a smaller amount if necessary; but the subsequent bleedings should be rather local than general, except where there is any renewal of the cerebral and circulatory excitement, which must be always met with activity. I believe the cases in which you must make the largest bleedings are those in which there are symptoms of an hypertrophied heart. But where this is not present, one or two bold bleedings, followed by local depletion of the head, will be sufficient. In cases of apoplexy, you may either open a vein or the temporal artery, for the objections made to arteriotomy in phrenitis do not apply so much to cases of apoplexy. There is no violence on the part of the patient, nor is there the same chance of the vessel giving way. The head should be shaved and freely leeched, and the patient may be cupped on the temples or the back of the neck.

Next in efficacy to general and local bleeding seems to be the administration of strong purgatives. There are many cases on record in which the coma and other symptoms have resisted bleeding, both general and local, but have disappeared under the influence of active purgation. One of the great objects in the treatment of apoplexy should be to get rid of the coma as soon as possible; and for this purpose nothing appears to answer better than the early use of brisk purgatives. Dr. Abercrombie recommends croton oil as the best purgative that can be employed, and indeed it is an excellent one; but if the patient can swallow, you need not be very anxious about the kind of purgatives you prescribe; any active purgative followed by a strong enema will do. Where the patient cannot swallow, you may mix the dose of croton oil with some mucilage, and pass it into the œsophagus by means of a gum-elastic tube.

After purgation, the next thing is to apply cold to the head by means of cold lotions, or iced water, or by pouring a stream of cold water on the head. This is a measure of great efficacy, and one which you may employ with safety and advantage.

In cases of apoplexy, where the coma has resisted free bleeding, both general and local, and where purgation and cold applications to the head have been employed without any decided effect, it seems advisable to apply a blister to the head or nape of the neck. You will recollect that I told you that blisters were always dangerous in the early periods of all acute visceral inflammations. This, however, does not apply so much to cases of hemorrhagic effusion like apoplexy, in which blisters may be employed at an earlier period than in cases of active inflammation. I would advise you, therefore, to use blisters in cases of apoplexy attended by persistent coma, having first put into practice the means already mentioned.

Many persons advise the use of emetics in apoplexy, but the facts bearing on this point, to which I have drawn your attention when speaking of inflammation of the brain, will also apply here. You may take it as a general rule, that where congestion of the head exists vomiting will always increase it, and must be therefore exceedingly dangerous. As far as theory goes it is totally against this practice, and I believe experience also is opposed to it. In a number of cases of disease of the brain, where emetics were employed, it has been found that an unfavourable result ensued, and there are some cases of apoplexy on record in which the exciting cause was a fit of vomiting.

Suppose that, after having taken away blood, purged actively, used cold applications, and blistered the head, the coma still remains, accompanied by a feeble pulse and cold skin, what are you to do? I believe, under these circumstances, and these alone, you may venture on the use of internal stimulants. Though this is at best but a forlorn hope, still the practice appears rational; we have analogy to guide us in the use of stimulants in such cases, and there are cases on record of persons who have recovered from this state by their judicious employment. The remedies most generally prescribed for this purpose are camphor, musk, and carbonate of ammonia. In the cases of typhus, we know that these remedies have frequently succeeded in removing the coma; but I repeat, that you should never have recourse to stimulants until the period for depletion has passed by, and all the ordinary means have failed.

I shall now suppose that we have succeeded in removing the coma, that consciousness has returned, and that nothing remains but paralysis of one side. Our great object is to get rid of the paralysis as soon as possible. Here you will recollect that you have to deal with paralysis depending on extravasation, a paralysis which, as far as we know, will not disappear under any form of treatment until the extravasated blood has been absorbed. The first thing, then, you have to do, is to adopt measures to prevent a return of the attack. This is to be effected by carefully restricting the patient in his diet, by avoiding all causes of cerebral irritation, whether physical or moral, and by obviating everything capable of exciting the

circulation. But you should not be content with this: you should from time to time employ local depletion, which in cases of this kind has a double utility. It tends to prevent a repetition of the attack, and, by lowering the circulation, keeps the brain in that non-inflammatory condition which is most favourable towards promoting the absorption of the coagulum. In many cases, also, you will find it of great advantage to establish a drain in the vicinity of the disease, and a great deal of good may be done by putting a seton, or an issue, in the neck. You must also pay constant attention to the state of the bowels and urinary system in cases of paralysis; keeping up a steady but mild action of the bowels has an excellent effect, and I need not impress upon you the necessity of paying strict attention to the bladder.

The paralysis which supervenes on an attack of apoplexy, is to be treated always in the first place by means directed to the head, and the brain is to be put in such a state as will favour the removal of the clot by the means already recommended; in addition to which it will be necessary that the body and extremities should be kept in a warm temperature. But there is this very singular circumstance connected with some cases of paralysis, that a period will arrive when, although the original disease of the brain has been removed, and the clot absorbed, the paralysis still continues. It is not easy to explain the circumstance; but it has been observed in many persons who have been paralytic, that the clot was completely absorbed, and no existing trace of disease discoverable, such as would account for the continuance of the paralysis. In cases like this we must adopt a different mode of practice, and have recourse to measures capable of exciting the brain, and we have reason to believe that whatever will excite the brain and restore its energy (I must use this phrase for the want of a better) will cure the paralysis. We find that in some cases where the brain of a patient, under such circumstances, has been exposed to any sudden stimulus, whether physical or moral, the symptoms of paralysis have disappeared, sometimes gradually and slowly, at other times rapidly and at once. Now, this disappearance of the symptoms shows that the paralysis did not then depend on the presence of a clot, for if an unabsorbed coagulum remained in the situation of the original extravasation, the paralysis would not disappear. But it has been frequently observed, that a patient, labouring under paralysis, may get rid of his symptoms suddenly, or that, at a certain period, they begin to decline, and then go away altogether. From a consideration of these circumstances we are led to divide the treatment of paralysis of this description into two parts, and endeavour first to excite the brain itself, and next the nerves which supply the paralysed limbs. For this purpose several remedies, supposed to be capable of stimulating the brain, so far as its action on the muscular system is concerned, have been recommended, the most important of which is the nux vomica, or its active principle, strychnine. The researches and experiments of modern medicine

have already established the efficacy of strychnine in such cases, but you will recollect, as I before stated, that this powerful remedy can be employed with safety only in cases where the paralysis continues after the disappearance of organic disease of the brain. Until that period arrives, and all symptoms of congestion and excitement are removed, it would be improper to prescribe the use of strychnine. One of the most recent publications on this subject is from the pen of Dr. Bardsley of Manchester, in which you will find an exceedingly interesting series of cases treated with strychnine, and many of them with the most decided success. In most of these cases you will find that Dr. Bardsley, even where the disease has been of some standing, *precedes the use of strychnine by measures calculated to deplete the head*, even though the cases were chronic. Hence, whenever you are about to prescribe this remedy, you should be satisfied that depletion has been sufficiently performed. You may be called to treat a patient for paralysis after an apoplectic attack. Here you must consider how far you are to premise the use of strychnine by depleting measures, and you must also reflect that we here have shadowed out one of the most important principles in medicine, *that in almost all cases where a cure is to be attained by stimulation, it will be effected more readily, and with much more certainty, when preceded by local depletion, no matter how long the disease may have lasted.* The efficacy of strychnine in paralysis seems to be dependent on the antecedence of local or general depletion.

Strychnine being an exceedingly active remedy, and having a most powerful effect in stimulating the brain, it being also one of the accumulative class of medicines, it will be proper to commence its exhibition with a very small dose, and watch its effects with care. The following is the formula which I would recommend you to employ. You take a grain of strychnine, and your object being to divide it into a number of equal parts, (say sixteen,) to insure an accurate division, you dissolve it in a small quantity of alcohol, and, having mixed this solution with a sufficient quantity of bread-crumb or conserve of roses, you divide it carefully into sixteen equal pills. In this way you may be tolerably certain that each pill contains one-sixteenth of a grain. Begin at first with one pill a day, next day you may give two, and so on until you have brought it up to half a grain or a grain, watching carefully its effects. Now, what are these effects? They are very analogous to the phenomena produced by inflammation of the brain taking place in the vicinity of the clot, namely, spasms of the muscular system.

It is also a curious fact, that these spasms are principally observed on the paralysed side; in other words, that the portion of the brain which has been affected by disease is more sensible to the stimulus of the strychnine, the consequence of which is spasmodic twitches in the paralysed limbs. The great nicety of practice in the treatment of paralysis in this way, is to keep up a certain degree

of this irritation without letting it proceed to any degree of violence, and to omit it whenever the following symptoms become manifest — headache, giddiness, weakness and sickness of the stomach, and too violent spasmodic twitches of the limbs.

There is a great difference with respect to susceptibility of the effects of this remedy in different individuals; in some the effects speedily appear, and you are obliged to intermit its use; others will bear large doses for a considerable time, and you may push the strychnine until a grain or a grain and a half is taken in the day. I have myself given to one patient a grain every day for the space of a fortnight without any intermission. In all cases, however, it will be necessary to watch the symptoms. There is one effect of strychnine which appears to be unfavourable, and whenever it occurs you should either omit the medicine or diminish the dose. Along with or succeeding the spasms, *there is a tonic rigidity of the limbs;* when this occurs you should be cautious in the administration of strychnine. The length of time which it should be continued will of course vary according to circumstances, but you should be aware that it requires a considerable period of time to produce its effects. In all Dr. Bardsley's cases, and in all those treated at the Meath Hospital, it has been continued for a considerable time, certainly more than a month. It is also necessary for you to recollect that strychnine is one of those medicines which are termed accumulative, that is to say, remedies, the operation of which, after remaining latent for some time, suddenly explodes with great violence. When this occurs, the strychnine must be immediately given up, and steps taken to control its effects. One of the best things for this purpose is the carbonate of ammonia with some mild anodyne. I have seen very severe spasms from the use of this medicine. In one case these spasms were so violent as to roll the patient nearly out of bed.

It has been proposed to employ brucine as a substitute for strychnine. Of this remedy I can say but very little; I have given it but very seldom; I believe in only two cases, and in these without any sensible effect. It is much weaker than the former remedy, one-fourth of a grain of strychnine being equal to six grains of brucine. Other remedies have been proposed for the same purpose, among the rest, iodine, which has been recommended by Dr. Mansfield.

The next class of remedies are those which are employed for the purpose of exciting the nerves of the paralyzed limb. As my time, however, has expired, I must postpone the consideration of these until our next meeting.

LECTURE XC.

Paralysis—Local treatment of—Flesh-brush, shower-bath, &c.—Application of moxa—Cases in which it is useful—Professor M'Namara's plan—Acupuncture with galvanism—Electro-puncturation—Method of applying—Powerful action of small battery—Mr. Hamilton's observations—Value of galvanism and electricity—Use of, in paralysis of the muscles of the face—Paralysis from disease of the arterial system—Case of, by Dr. Graves—Diagnosis of this affection—Pathology of Pott's gangrene—Dupuytren's mode of treatment.

Having spoken of the general treatment of paralysis after apoplexy, we come now to the local management of the disease, or that portion of its treatment which consists in the application of stimulants to the nerves and their organs. Local stimulation of paralytic limbs may be performed in a variety of ways; all the usual stimulant embrocations may be employed for this purpose with the best effects. I shall not take up your time in detailing the different kinds of liniments which are used on such occasions; they are universally known, and may be varied *ad infinitum*. The flesh-brush, the shower-bath, either tepid or cold, occasional blisters to the spine, or along the course of the nerves, croton oil and terebinthinate frictions — all these are measures that may be employed with advantage. The use of the moxa has been also strongly recommended, and appears to be decidedly beneficial. The efficacy of all these remedies, however, seems to depend chiefly on the particular stage and nature of the disease, and hence their good effects are most apparent in those cases where the paralysis no longer depends on organic disease of the brain, but seems to be connected with that peculiar state of the nervous system which arises from a long interruption of the power of transmitting volition. It is in cases like this that the application of the moxa has been found to produce the most favourable results. Where the lower extremities are affected, it may be applied over the sciatic nerve on the loins, or a little below and to the outer side of the popliteal space over the track of the peroneal nerve. In case of paralysis of the upper extremity, you may apply it to the back of the neck, or in the neighbourhood of the brachial plexus.

A gentleman who does me the honour of attending these lectures, has related to me the particulars of a remarkable case, which I shall mention *en passant*. A young female was subject to repeated violent attacks of spasms with contraction in one of the upper extremities. She had laboured under this affection for a long time, and tried various remedies without benefit. At the suggestion of this gentleman she tried cupping in the neighbourhood of the shoulder and brachial plexus, and found that it produced decided relief to the symptoms. In this case it is highly probable that the disease was seated in the brachial plexus, and had no connexion with the brain, for it had continued for a great length of time (more

than three years, I believe) without any remarkable variation in its symptoms. If the spasms of the arm had been produced by irritation of the brain, she would in all probability have had paralysis long before this period; this, however, did not occur, and the probability that the disease was seated in the brachial plexus is still further confirmed by the fact, that the spasms were relieved by local bleedings. Here we have the spasms relieved by antiphlogistic means, but in a case of atony of the same nerves most benefit would be derived from the use of stimulants. The more completely the paralysis is of this description, the more sure will be the effects of local stimulation. You will sometimes meet with cases of paralysis from pressure on the nerves without organic disease. Thus there is a case on record of a person who lost the use of one of his upper extremities, from having leaned too long over a bench at a public meeting. I recollect the case of a man, who during a fit of intoxication fell asleep with his arm thrown over the back of a chair, and awoke with perfect paralysis of the hand. Cases like these are seldom of long duration, and are much improved by the application of the moxa. I may state, however, that permanent paralysis has been induced in this way. The best way of using the moxa is, not to make a deep eschar, but to touch the parts slightly, and repeat the application frequently. In the case of paralysis of the hand, immediate relief followed the use of the moxa to the back of the wrist.

While on this subject I may advise you always to employ the moxa in the mode first, I believe, devised by my friend and colleague, Professor M'Namara. The top of the moxa is to be dipped in a strong solution of the oxymuriate of potass, which is to be allowed to dry upon it. The moxa being fixed to the part by a little gum, a drop of strong sulphuric acid will produce immediate ignition. In this way you prevent all the alarm which the patient feels at seeing a lighted candle brought to the bed-side. The same rule is to be observed when you employ electricity, the best mode of using which is to place the patient on an insulated stool, and draw sparks from, or shocks through, the affected limbs. Electricity frequently does much good in such cases; but, in order to obtain decided benefit from it, you must persevere for some time in its employment. It has been lately proposed to employ the stimulus of electricity and galvanism in a different way, by transmitting it directly to the muscles of the affected limbs by means of needles, which are to be inserted into different parts of paralysed extremities, and which are intended to act as conductors for transmitting the galvanic influence. This has been termed *electro or galvanic puncturation*, and forms an excellent mode of applying the stimulus of galvanism. I have made many experiments as to its effects, to which I shall briefly direct your attention.

The first thing to be considered is the manner of its application. The following is that which I use at the Meath Hospital:— Having procured two fine sewing needles, your first step will be to

take the temper out of them; for, if you employ them in the tempered state, you will run the risk of their breaking in the flesh, and this would be very disagreeable. You can easily take the temper out of them by holding them in a candle until they become red hot, and then letting them cool gradually. The next thing is to place a head which will remain firm on the needle, and for this purpose you pass a small portion of thread through the eye, and then cover it with a bit of melted sealing wax. Having thus formed a head for the needle, you sharpen its point, and polish it by the emery pincushion, and the sharper it is the better. There is nothing more simple than to introduce the needles. You make the part of the skin tense with your finger and thumb, where you intend to introduce them, and, placing the point of the needle perpendicularly on it, you press it downwards in a slanting direction, using, at the same time, a rotatory motion, and thus easily pass it in; when you have pierced the skin and fascia, there is no difficulty in introducing it into the muscular fibres. The distance between the needles must be regulated according to circumstances. You then proceed to send the galvanic fluid to the part, and, for this purpose, the best mode is to employ a small galvanic battery with a limited number of plates. If you have plates of from two to three square inches you will find that from fifteen to twenty of these, in a state of ordinary action, will be quite sufficient, particularly in the commencement of the treatment. It is a curious fact, that the intensity of the shock is increased to an extraordinary degree by means of the needles. A battery which in the usual manner would not communicate any shock, will, when used with the needles, give a violent one, and communicate such a stimulus to the nerves as will throw the whole limb into violent spasms, and cause a copious perspiration to break out over the body. I have seen very great effects from a feeble battery in this way, and it would appear that this is the result of the *direct* transmission of the galvanic influence to the muscular fibre. In most cases a perspiration is brought on, the limb convulsed, and sometimes the whole body is thrown into spasms. As an illustration of the power of the battery when used in this way, I shall mention the following case: — A patient, who was under the care of Mr. Hamilton, laboured under amaurosis; he was anxious to try the effect of galvanism, and with this view inserted one needle in the upper part of the back of the neck, and another over the orbit, so as to direct the course of the fluid across the base of the brain. He intended at first to use a small battery of twenty-five plates, but it struck him that even twenty-five might be too much. He made the experiment with three pairs of plates, and, the shock being given, the patient, to his astonishment, fell back as if he had been stunned by a violent blow on the head, and remained for nearly a minute in a state of insensibility. In other cases, too, where the galvanism was applied in the vicinity of the head, I have found that severe headache, giddiness, and even a stiffness of the

muscles of the face, were produced; all showing its powerful action on the nervous centre.

Some singular circumstances connected with this subject were observed in the Meath Hospital. It was found that after a certain number of shocks had been communicated to the parts, when you came to withdraw the needles there was a very remarkable difference in the case of removing them. The needle through which the positive galvanic influence had been transmitted, was found to be strongly fastened in its situation, while that to which the negative pole had been applied, slipped out with the greatest ease. This result was constant. In some cases, where half a dozen shocks or so have been given, the extraction of the positive needle has been only accomplished with considerable pain to the patient.

It has been suggested by a distinguished scientific friend of mine, that this results from the coagulation of albumen at the positive pole. Mr. Hamilton, however, who performed most of the operations for me, thinks that the true explanation is the paralysing effect of the negative pole on the muscular fibre, while the positive needle is firmly grasped by the increased contraction. Further researches are necessary on this point. Another fact connected with this subject is, that when the needles have been inserted into a large muscular mass, the positive needle is powerfully retracted, and carried, as it were, into the muscles. In one case, where the needle was inserted into the lumbar muscles, in a patient labouring under sciatica, more than one-twelfth of an inch of it was drawn in at each shock; so that, after a certain number of shocks, it passed up to the head. This is one reason for using the sealing-wax head, in order to prevent the complete passing in of the needle.

With respect to our experience of the value of this mode of employing electricity or galvanism, I have to remark that, if galvanism or electricity can be of any use to paralysed limbs, this is one of the best modes in which it can be supplied. The apparatus is simple, can be prepared in a moment, and does not depend on the state of the weather, like the ordinary electrical machines. There is another advantage, also; it is not so likely to excite alarm in the mind of the patient. We have employed it in several rheumatic and paralytic cases in the Meath Hospital, but have not as yet been able to say that decided benefit has accrued from it to the majority of the patients on whom it has been tried. This is more particularly true with respect to paralytic patients; in the rheumatic cases we have found it more beneficial. In a remarkable case, where the deltoid muscle was paralysed and atrophied from some affection of its nerves, Mr. Hamilton tried it for a fortnight without any good effects. In a case of senile amaurosis, its effects was to produce flashes of light before the eyes, lachrymation, and contraction of the pupil, but after a fortnight's trial there was no improvement in the sight. We have had, however, distinct and unequivocal proofs of its value in one case of paralysis of the muscles of the face,

which had all the characters of that described by Sir C. Bell, as resulting from an affection of the seventh pair of nerves. I have not the notes of this case at present, but shall bring them down and lay them before you on to-morrow. I may, however, observe, at present, that this patient had been for a long time labouring under an affection of one side of the face, and had used a variety of remedies. Those principally employed were stimulating liniments and the internal use of strychnine, from which he derived some slight benefit; but the application of the galvanic fluid, in the way I have mentioned, was followed by decided and rapid improvement. Indeed, from the time it was first applied, the patient recovered rapidly, so that in a very short time all the deformity of face disappeared. Now the value of the application is to be estimated in this way. Here we have a case of paralysis of a local nature, and not depending upon any disease of the brain; in this case the galvano-puncturation was tried, and found to be most beneficial. The conclusion, then, as far as a single case goes, is, that this mode of treatment is best adapted to the form of paralysis just mentioned, in which we find an affection of some of the muscles remaining after the original disease of the brain has been removed. The same observation, I need not tell you, applies to all other remedies which are employed for the purpose of local stimulation.

Before I leave the subject of paralysis, there are two points to which I wish to call your attention. One of these involves the consideration of a remarkable form of paralysis in which the disease appears, as far as we can see, not to depend on any primary lesion of the *nervous system.* In this form we have a paralysis, not the result of any disease of the brain or nerves, but connected with an affection of the vessels of the part. This is a very singular disease, and I am anxious you should be acquainted with it, for I believe it is by no means so rare as many persons think. The other point to which I would direct your attention refers to the influence of magnetism on the human body; of this I shall speak on a future occasion, confining myself for the present to that form of paralysis which is connected with disease of the *vascular system.*

So as to give you some idea of this affection, I think I cannot do better than read for you the notes of a case of it, published by Dr. Graves and myself in the fifth volume of the Dublin Hospital Reports.

A man, aged 44 years, was attacked in December, 1828, with alternate sensations of cold and burning heat in the toes of the right foot. These extended to the leg, of which the power became diminished. Pains in the foot next occurred, and in a month the part became cold and wholly deprived of sensation.

On the day of his admission the pain suddenly extended to the calf of the leg; and from this time he lost all power of motion in the leg. On admission, the temperature of the body, with the excep-

tion of the affected limb, was natural. The pain had extended to the thigh during the night. The temperature of the limb was but 58° of Fahrenheit. Slight œdema existed about the ankle. There was complete loss of sensation from the middle of the thigh to the toes; the patient could rotate the thigh slightly, but there was no other voluntary motion possible. The femoral artery appeared like a hard cord, painful on pressure, and without pulsation. By the stethoscope we found that pulsation was also wanting in the common iliac on this side, while that of the left iliac was plainly perceptible. The patient died on the fourth day after admission, the limb having become purple, tender, and covered with vesications.

On dissection, the right common iliac appeared distended and livid, and was completely plugged up by a dark clot, extending to the external and internal iliacs, and engaging the gluteal and obturator arteries. The same occurred in the femoral and profunda, and extended, as far as they could be traced, to the tibial arteries, and to the peroneal. The lining membrane of these vessels was soft, villous, and red; the clot in some places being separated from it by a layer of puriform matter. No disease in the veins. A large portion of the vasti and rectus muscles was *white* and hardened. Here you perceive a train of symptoms, some of which might be referred to disease of the brain, if the man had any cerebral symptoms, which was not the case, for his intellect was sound, and he had no evidence of cerebral disease except the paralysis.

His constitutional symptoms were emaciation, prostration of strength, and loss of appetite. The temperature of the body was natural, but, on examining the limb, we found (and this is a point of great importance) that it was as low as 58° of Fahrenheit; in fact, it was quite cold. There was also complete loss of sensation from the middle of the thigh to the toes, and though he could rotate the limb slightly, it was, in all other respects, powerless. Here we have paralysis of motion and sensation in one of the extremities, *with remarkable coldness of the limb.* On making an examination along the track of the femoral artery, we found that it was painful on pressure, *without any pulsation*, and conveying to the finger the feel of a piece of hard cord. From a consideration of those circumstances, we came to the conclusion that it was not pervious, and that this would account for the state of the limb. In this case, also, we made another remark, and this, I believe, is the only instance on record in which such a diagnosis was made. Up as high as the groin the pulsation of the femoral artery could not be felt, and we were anxious to ascertain how far further the disease extended. The state of the femoral artery in the left groin was natural. On making an examination with the stethoscope, we found that the pulsations of the aorta were perceptible down to its bifurcation, but when the stethoscope was applied below this on either side, we observed that there was no pulsation in the right

common iliac artery, but on the left side it could be traced distinctly down to the groin. Here, then, we had a train of phenomena, such as ordinarily occur in paralysis affecting the right lower extremity, and along with this an obstruction to the circulation in the thigh and leg. From these circumstances we made the diagnosis of obstruction of the right iliac and femoral arteries. On dissection, we found that the aorta was healthy to within about six inches of its bifurcation; below this point it was partly filled by a red clot. The left common iliac was healthy, but the right was plugged up with a dark red clot, which extended into the external iliac and obturator arteries, filling up also the femoral and its branches. The case, in fact, was nothing more or less than one of chronic arteritis.

This remarkable form of disease has been also observed by other authors. You will find it well described in Rostan's work on Diseases of the Brain, where he mentions that this loss of sensation and motion in a limb is sometimes produced by obstruction of its vessels. In persons advanced in life, the arteries are also frequently obstructed by the formation of ossific deposits within them, producing loss of power, coldness, and diminution of sensation, as in the foregoing case. A similar effect may occur from the pressure of an adjoining tumour on the trunk of a principal artery.

Paralysis resulting from disease of the arterial system is distinguished from paralysis caused by cerebral disease, by the following marks; first, by the colour of the integuments of the affected limb, which, in a case of the former description, are generally of a violet hue, or of a much deeper tinge than in the latter case, or in a state of health. It is very rare to find the two limbs of the same colour, as we do in cases of cerebral paralysis. Another mark is, that the temperature of the limb is always lower than that of the healthy one; but the distinctive sign of this form of paralysis *is the absence of pulsation in the arteries in parts where it should be naturally observed.* If to this description you join the absence of cerebral symptoms, you will seldom fail in making a correct diagnosis. I have had two cases of this disease under my care; one of them occurred in the upper, the other in the lower extremity, and, from observing the characteristic marks already detailed, I had no difficulty in making the diagnosis. It is to that peculiar form of this disease, which is considered by some authors to depend on ossification of the arteries, that the name of "Pott's gangrene" has been applied. A great deal of light has been thrown on this disease by the researches of modern pathology. It is now pretty well established that we may have this gangrene, not only in old persons from ossification of the arteries, but also in the young from arteritis. In truth, the pathology of Pott's gangrene appears to be one of two changes — either an arteritis or ossification of the arteries themselves; and of these two causes the first is by far the most frequent. You will see at once the importance of this view of the question, for if the gangrene occurs in a young person, and is con-

nected with inflammation of the arteries, it is a disease more or less under the control of medical treatment; but if it be produced by ossification of the arteries, the results of treatment are far less likely to be successful.

We have, then, in a case of paralysis of this description, more or less loss of sensation and motion, coldness of the limb, and absence of arterial pulsation. With respect to coldness, it may be said that it is of little value as a sign, being frequently observed in cases of cerebral paralysis. To this it may be replied, that though coldness is sometimes present in cases of ordinary paralysis, still it is never so remarkable as in this form of the disease, and the temperature of the limb is but a few degrees below the standard of health. Dr. Abercrombie makes a very interesting conjecture on this subject. He says the temperature of paralysed limbs is generally considered to be lower than that of the healthy ones, and, indeed, such is the case; but the true explanation of this occurrence is, that in this condition the limb loses its power of preserving a medium temperature, and hence it is, that, according to the temperature to which it has been exposed, it becomes hotter or colder than the healthy limb. A case is mentioned, of a medical man who laboured under paralysis of one of the upper extremities. This gentleman, on one occasion, after having applied some warm bran to the paralysed limb, was astonished to find, on touching it with the sound hand, that he could not bear the heat, though he was at the same time unconscious of any increase of temperature in the paralytic extremity.

The symptoms, then, of this form of paralysis are, diminution or abolition of sensation and the power of motion, a dark or violet hue of the skin, a remarkable coldness, and absence of pulsation in the arterial trunks which supply the affected limb. These, with a tendency to the formation of gangrene, are the characteristic marks of the disease, and by bearing them in mind you will seldom err in making a diagnosis. In the great majority of cases the disease is confined to one extremity; but Rostan gives some cases in which it was more general. We might also add to the diagnosis, that paralysis connected with disease of the brain often comes on suddenly, while in this case its invasion is slow and gradual. It is however true, that some cases of paralysis, depending on this cause, have come on so suddenly as to render this circumstance of less value as a diagnostic.

With respect to the treatment of this form of paralysis, if the patient be young and the disease recognised at an early stage, it is possible that you may be able to arrest it by free local depletion and other antiphlogistic means. In the case which was under treatment in the Meath Hospital, the symptoms had lasted for a considerable time before the disease exhibited any remarkable violence. The man was admitted on the 7th of February, and at this time the disease had been five weeks in existence, having begun at the lower part of the limb, and extended gradually upwards until it involved

the whole leg and thigh. Yet it is very probable that this patient might have been saved, if proper means had been taken to arrest the inflammation of the vessels at an early period. Baron Dupuytren has published a case, in which it appeared that this disease was setting in, but was checked at once by bold antiphlogistic treatment directed to the affected limb.

LECTURE XCI.

PARALYSIS FROM ARTERIAL DISEASE—Singular cases of, by Rostan—Diagnosis of paralysis from arterial obstruction—Magnetism, use and action of—Effect of magnetism in disease—Result of trials in the Meath Hospital—Paraplegia—Mechanical hyperæmia—Occurrence without disease of the cord or vertebræ—Cases by Mr. Stanley—Effects on urine by division of the spinal cord—Ammoniacal urine—Caries of the vertebræ—Diagnosis of paralysis with disease of the kidney—Prognosis in paraplegia—[Dr. Graves's views and cases of paraplegia—A sequence of fever—Means of prevention and cure—Local injury to a nerve causing partial paralysis.]

AT my last lecture I spoke of that form of paralysis which depends on arterial obstruction, and mentioned, as one of the principal diagnostics, a remarkable coldness of the diseased limb. I quoted for you a passage from Dr. Abercrombie's work, in which he suggests that it is probable that the actual condition of paralytic limbs, in the usual acceptation, so far as temperature is concerned, depends upon their having lost that power which animal bodies possess of preserving a medium temperature; so that their temperature becomes elevated or lowered, according to that of the surrounding matter. The general rule in cases of this description is, that the temperature of a paralysed member is a little lower (say two or three degrees) than the rest of the body; but when we find a limb reduced to the temperature of 58°, as in the case I mentioned, it is quite a different thing, and, under such circumstances, the great probability is, that the paralysis is connected with arterial obstruction.

You will see, in Rostan's work on the Softening of the Brain, the reports of two cases of this disease, occurring in patients of extremely advanced age. In one, there was complete paralysis of the right arm, which was cold and livid. The fingers were threatened with gangrene, and no pulsation could be felt in the radial artery. By stimulating frictions, a certain degree of warmth and motion was restored, and it was even thought that pulsation could be perceived. By degrees, the power of the left arm, and of the lower extremities, began to fail, with diminution of the force of the pulsation. On dissection, extensive disease of the arteries was found; the right brachial, at the insertion of the deltoid, was obliterated by a mass of fibrin, below which the vessel was contracted and closed: the left brachial artery was also narrowed, but without any clot; and this condition was further met with in the crural

vessels. The cerebral arteries and the aorta were diseased. In the second case, the patient, aged 80, was attacked with violent pains in the left leg, which became cold and bluish. There was no lesion of intelligence, and the corresponding arm was unaffected. In fifteen days, the pains having augmented, a certain degree of paralysis supervened, which, however, was never complete. On dissection (the disease having lasted a month), the crural artery was found extensively obliterated by a fibrinous clot. Here you observe that notwithstanding the great age of both patients, the disease was not *ossification*, but, in all probability, *arteritis*.

At our last meeting, I forgot to mention the particulars of a case, bearing on this part of the subject, and which goes to prove that even complete coldness of the affected limb is not, in itself, sufficient to establish the diagnosis of paralysis from arterial obstruction. I have had lately under my care a gentleman who has been for the last four or five years labouring under paralysis of the lower extremities, unaccompanied by any symptoms indicating disease of the brain. His intellect remains not only unimpaired, but in a state of high activity: and, what is equally singular, he has had none of the usual symptoms of disease of the vertebræ or spinal cord. His limbs, however, are quite powerless, and are of an *icy coldness;* and yet you will hardly believe me, when I tell you that I have repeatedly felt the femoral, popliteal, and even the anterior tibial arteries, pulsating distinctly. This is a singular fact, but I have verified it by a number of observations. You will perceive, then, that in taking a remarkably diminished temperature as a diagnostic of paralysis from arterial obstruction, we must admit that, as a sign, it is only valuable *when combined with absence of arterial pulsation.* In this case, the fact of such extreme coldness of the lower extremities, at the same time that their circulation continues with undiminished activity, becomes of great importance, as tending to prove that the temperature of the body depends more upon the state of innervation than on arterial action. There are, indeed, many facts which go to prove that animal heat is more closely connected with the nervous system than with the circulating.

I spoke of the employment of electricity and galvanism in the local treatment of paralysis. While on this subject, I shall take an opportunity of briefly drawing your attention to the use of magnetism in certain cases of nervous disease. Here let me be understood, I am not going to lecture on *animal magnetism;* it is, at present, a theme unsuited for the practical physician; no one more firmly disbelieves, no one more thoroughly despises, than I do, the countless absurdities which have emanated from the imaginative disciples of animal magnetism. But as in almost every human hypothesis there is a fraction of truth, so in the doctrines of animal magnetism there is, perhaps, something which may not be entirely visionary; and it is possible that there may be some modification of the nervous influence, communicable from one person to another: this is one of the doctrines of animal magnetism. Another leading

doctrine is, that organs, which are adapted by nature for the discharge of some peculiar function, appear in their magnetised state to take on a new function. Now, without saying that we are to believe in this, or in the extraordinary romances which are given in illustration of it, still it is right to admit the possibility of its occurrence, to a certain degree; because we frequently observe, in pathology, many instances of organs taking on functions, not merely new, but even totally repugnant to our ideas of their structural arrangements. We may, then, I think, without going too far, admit the possibility of a communication of some modification of the nervous influence from one person to another, and that organs under this influence may take on new functions; but, in the present state of this subject, this is as far as we can go.

But we have to deal, at present, with a more tangible and important subject — namely, the action of magnetism, in its proper acceptation, on the human body. You are aware that the term *animal magnetism* was first applied to the results of certain effects on the human system, which were supposed to be brought about by the aid of metallic contact; and you are all acquainted with the history of the metallic tractors. The term *magnetism*, however, is totally inapplicable to the communication of nervous influence from one individual to another; nor have we any grounds for connecting such phenomena with magnetism, in its proper acceptation.

That a magnet should act on the human body, is neither extraordinary nor incredible. You know that electricity, and its modification galvanism, have a powerful influence on the system; and modern researches have shown that there is a close connection, if not an absolute identity, between electricity and magnetism. Now, on this subject of magnetism, the researches of some eminent men have been, latterly, employed, and the results of their labours have been received by some with an undistinguishing credulity, and by others with unphilosophical skepticism. One of the principal things which has prevented medical men from entering on this subject is, that many persons have confounded the results of magnetic action on the human body with the absurdities of animal magnetism and metallic tractors. There is, however, I need not repeat to you, an essential difference between them. In the Meath Hospital I have lately made a number of experiments, with a view to ascertain the effects of a powerful magnet on the human body. The magnet which I used was one of considerable power, being, in its highest state of action, capable of supporting a weight of more than twenty pounds. Now, in almost every instance where this instrument was used, we found that, when brought near to sensible surfaces, phenomena were produced which were very similar, indeed, to those of electricity. These phenomena also appeared in so many cases, and with such a remarkable constancy, that they could not be accounted for by any supposition of accident. We have applied it in cases of rheumatism, sometimes to a healthy

part of the body, sometimes to the part affected. In one of these cases, the application of the magnet was followed by a very rapid subsidence of the morbid symptoms, and the patient got well in a few days. Here let me remark, that there is no one more opposed than I am to the publication of the result of a single case as a proof of the success of any particular remedy; and, in putting forward this case, I do not wish it to be received as an instance of a decided cure of rheumatism by magnetism. The only reason why I quote it, is, because in other cases of rheumatism we had distinct evidence of the influence of the magnet to a greater or less extent. The patient, a stout man, of good constitution and in the prime of life, was brought into the hospital for an attack of rheumatism in the back and left shoulder, which had come on after exposure to wet. The first seizure was three days before admission. When brought in, he had severe pain in the back and shoulder, increased on pressure; he could neither elevate his arm to his head, nor could he bend the head towards the shoulder, without great difficulty and suffering. The value of this case consists chiefly in this, that except using the magnet there was no other remedy employed; if any other medicinal agency had been used, it would have been difficult to attribute the merit of the cure to magnetism. I applied, in this case, the large magnet to the shoulder, within a short distance from the skin. In about half a minute the patient remarked that he felt a kind of pricking sensation immediately under the magnet; this was succeeded by a feeling of heat in the part, which became increased by continuing the application, while at the same time the pain was sensibly relieved. The sensation of warmth continued in the shoulder for about ten minutes after the magnet had been removed, and the patient declared that he received great benefit from the application. On the following day, the magnet was applied again with precisely the same results; the same thing was done on the third day, when the pain was very much reduced, and the arm became more moveable. On the fourth day, the mobility of the limb was increased, and he could bend his head in the direction of the shoulder with very little inconvenience. On the eighth day, the power of motion was restored, the pain gone, and the patient left the hospital quite well. I have heard nothing of him since; but if he had not experienced permanent relief, it is very probable he would have returned again, for he seemed quite pleased with his treatment. If this was the only case in which the magnet had been employed, it would prove nothing neither for or against its use. It might be said, that the cure, in this instance, was the result of keeping the patient in a warm bed, and that any good, supposed to be effected by the magnet, might be attributed to the influence of imagination. But to this it may be answered, that the sensations observed by this patient were *exactly the same as in others*, each having noticed the peculiar pricking sensation in the part to which the magnet was applied, and the subsequent feeling of warmth. Again, it is to be remarked, that although the symp-

toms in this case were severe, the cure was extremely rapid; and when you recollect the obstinacy of most affections of this kind, you must allow that a week was a very short space of time for its accomplishment.

The following is another equally interesting case. A woman was admitted into the Meath Hospital labouring under paralysis of the right side of three weeks' standing. The history of her case was, that she had fallen into a state of mental despondency, after the death of her husband, who was her only support; she then got symptoms of derangement of the stomach, and hypochondriasis, followed by an attack of paralysis, which deprived her of the power of using one side. On examination, we found that, as far as motion was concerned, the paralysis was not complete, but that there was a total loss of sensation in the side affected. I was curious to observe what the effect of the magnet would be, and accordingly applied it to the spine, moving it upwards and downwards along the cervical and dorsal regions, at about half an inch from the surface. After it had been applied for a few seconds, she remarked that she felt a sensation "of wind" passing over the left shoulder, but not over the right. Observe, it was on the right side of the body that the paralysis existed in this case; and you will also recollect that it was chiefly a paralysis of sensation. Now, it is quite contrary to chances that she should have described it in this way, if she had not really felt it in this situation. The action of the magnet was naturally felt on the left, which was the sensible side, for, on applying it to the opposite or paralysed side, she said she no longer felt the sensation of "the wind." During the operation, she saw the instrument; and if disposed to draw upon her imagination for a description of her sensations, she might say that she felt the aura on the paralysed side; but this was not the case, for she stated that it was no longer perceptible, when the magnet was moved from the sound to the paralysed side. In this case, I must tell you that magnetism was not the sole remedial agent employed, for she had been also leeched and blistered. She was admitted on the 12th of August, and on the 17th of the same month the power of motion in the upper extremity was so much increased, that she could grasp objects with force, and place her hand on the top of her head with facility. On this day, after having applied the magnet, she immediately exclaimed that she felt the wind for the first time over the right shoulder, and, on examination, it was found that sensation, to a certain degree, had returned to the right side; and here you will perceive that the first manifestation of the return of sensibility was denoted by her feeling the magnetic influence in the paralysed side.

I shall not take up your time any longer by detailing cases; it will be sufficient to state, that it was used in many other instances of a similar kind, and in all with the same result. Each patient described the same sensation, with very little variety; in some, it consisted in a feeling of pricking or tingling; in others, of an aura

passing over the part. Some stated that they felt a sensation of warmth in the part, some time after the magnet had been applied; and some, a kind of suction, as if the skin was drawn towards the magnet. When it was applied over a very sensible or a blistered surface, the patients felt the pricking sensation to amount to pain, and the feeling of warmth and suction was proportionally increased. I have also to observe, that it was employed on a set of patients, the majority of whom were totally ignorant of its nature and effects; and yet it is very remarkable that there was an almost universal accordance in their descriptions of the sensation produced. It has been stated by some writers on the subject, that the sensations differ according to the pole of the magnet employed. This statement does not accord with our experience: for in every one of our cases the sensation was the same, whether we made use of one pole or the other. As far as our experience goes, it is, I think, fair to conclude that a very perceptible influence may be produced on the human body by the application of the magnet; it is another matter to ascertain how far it may be rendered available as a therapeutic agent. The cases in which I think it might be employed with advantage, are cases of nervous and spasmodic affections, and muscular rheumatism. That the sensations described by our patients had an actual existence, and were not the result of imagination, I am firmly convinced.

Before I leave the subject of paralysis, I wish to draw your attention to one more form of the disease, by no means uncommon; I allude to that in which *both* the lower extremities are exclusively engaged. This is a disease, or symptom, which may arise from a great number of causes, and be observed under a variety of circumstances. Generally speaking, however, it will, in almost every instance, be found to depend on some cause which engages the spinal marrow, either primarily or secondarily. I believe that this paraplegia, as the result of disease of the brain, is never met with except in combination with paralysis of the upper extremities. General paralysis may be produced by cerebral disease; and in describing the various forms of paralysis which depend on disease of the brain, this form has been particularly noticed; but when paralysis of the lower extremities *alone* occurs, it is generally the result of some lesion of the spinal marrow, either organic or functional, below the situation in which the brachial nerves are given off. Among the causes by which this paraplegia is produced, the following are the principal: inflammations of the membranous coverings of the spinal cord, with effusion of lymph or serum; spinal apoplexy, ramollissement from inflammation of its substance; pressure on the cord, by solid tumours from a variety of causes; the bursting of abscesses or aneurismal swellings into the vertebral canal, as occurs in some cases of aneurism of the abdominal aorta. Thus, during the progress of a case of this description, it has been observed that the patient suddenly became paraplegic, and, on examination after death, a quantity of blood, which escaped from the

aneurismal tumour, has been found compressing the spinal marrow. Lastly, recent investigations have established the fact, that we may have paralysis of the lower extremities, and yet, on dissection, *we cannot detect any traces of disease of the bones of the vertebral canal, or in the membranes or substance of the spinal cord.* Hence you see how cautious you should be in making the diagnosis, so common among surgeons, of caries of the vertebræ, in cases of paralysis of the lower extremities. The truth is, that in the present state of medicine on this subject, we labour under very great difficulties; the diagnosis of these affections is exceedingly obscure; it is a subject still open to investigation, and, I need not remark, that it is one of paramount importance.

Paraplegia is one of the most miserable diseases to which the human body is liable. It is almost always obstinate and unmanageable, and in the majority of cases incurable. How far the fatality of the disease depends upon the want of an accurate diagnosis, and a correct plan of treatment, must be determined by future observations; but it is a fact, that a vast proportion of paraplegic patients die, and under the most melancholy circumstances. In many cases, the formation of gangrenous sores on the back and loins is a common occurrence. For this there are two reasons: first, the vessels of those parts exposed to pressure from position fall into that state which Andral terms *mechanical hyperæmia*, the result of which is that they are unable to unload themselves, a stasis of blood follows, and this leads to mortification of the part; secondly, there is a lesion of innervation. Hence it is, that the great majority of patients of this kind die with gangrenous sores on the back and loins. They have also most constantly paralysis of the bladder, or its sphincter, or both, producing retention of urine, or retention with incontinence, or stillicidium urinæ. The sphincter ani, too, is generally paralysed, and we have a most melancholy and disgusting source of annoyance. The frequent passing of urine and fæces keeps the unfortunate sufferer in a state at once pitiable and loathsome; and when, in addition to his other calamities, the gangrenous sores form, the supervention of low diffused erysipelatous inflammation may prove fatal; or he may be carried off with symptoms of typhus fever, from the absorption of putrid matter.

While on the subject of paraplegia, I am anxious to lay before you a sketch of some important opinions lately put forward by Mr. Stanley, of London. In the last number of the Medico-Chirurgical Transactions, this gentleman has written a most interesting paper, in which he gives the history of several cases of paraplegia, the majority of which were supposed to be examples of caries of the vertebræ, but in which, on dissection, no disease could be discovered, either in the bones of the vertebral canal, or in the membranes or substance of the spinal cord. You will ask, were there no pathological phenomena in these cases? There were; but they belonged not to the spine or its contents, but to an organ in its immediate vicinity — the kidney. From a candid review of Mr.

Stanley's cases, there appears to be reason to believe that disease of the kidneys may produce all those symptoms which have been attributed to lesions of the spinal marrow, or caries of the vertebræ. In the four first cases, the symptoms given as of caries of the vertebræ were present, and the cases treated as such. On dissection, no caries, or disease of the cord, could be discovered in any of them, but the kidneys were found to be the seat of extensive disease. The fifth case was a remarkable one; the patient had been admitted for retention of urine, the consequence of severe gonorrhœa, which had been checked by injections. The bladder and sphincter ani became paralytic, and he lost the power of the lower extremities to a certain degree. He also complained of severe pain at the fifth lumbar vertebræ. He distinctly traced the pain from the bladder to the left kidney, and then to the right. Paralysis of motion, and, nearly, completely of sensation of the lower limbs, next supervened, and in about a fortnight he died. On dissection the kidneys were found in a state of inflammatory softening, and with numerous minute depositions of pus. The bladder was inflamed, but the brain and spinal cord were perfectly healthy. In the sixth case, a patient, while in progress of cure of a gonorrhœa with phymosis, was suddenly seized with paraplegia. The functions of the brain were unaffected. He had suffered for a day or two from pain in the loins. Sixteen hours after this attack he suddenly died.

From considering the former cases, Mr. Stanley predicted that inflammation would be found in the kidneys. A slight turgescence of the vessels of the cord, with a little transparent effusion in the theca, were found, but the kidneys were in a state of the most intense engorgement. In this case, it was remarkable that, from the period of the paraplegia, there was an inordinate secretion of urine. The seventh case was that of a patient who, for two years, had been labouring under pain of the back, increased by pressure, and incontinence of urine. On dissection, there was some vascularity and effusion of the cord, but both the kidneys were almost entirely destroyed by disease. In addition to these, Mr. Stanley mentions four more cases, which were seen by a friend of his, Mr. Hunt, of Dartmouth, which corroborate his opinions.

Here, then, we may have well-marked paraplegia, without any perceptible organic change in the spinal cord, or its investments, but presenting distinct traces of disease of the kidneys. This leads us to observe the very close connection which exists between the kidneys and spinal cord, a connection which has been long recognised by medical practitioners, but only in a limited point of view; for though they were of opinion that disease of the kidneys, and a discharge of ammoniacal urine, were the results of spinal disease, they never seem to have reflected that the reverse of this might happen. It seems now, however, to be almost completely established, that disease of the kidneys may produce symptoms which are referrible to disease of the spine; and Mr. Stanley has the credit

of having been the first who directed the attention of the profession to this circumstance, and his paper must be considered as one of the most important, and practically useful, which has appeared for a length of time. You should all peruse it carefully. The fact that disease of the spine will give rise to affections of the kidney, is long known, and has been proved by numerous experiments. Thus, Olliviet details the experiments of a German physiologist, M. Kreimer, who, by dividing the lower part of the spinal cord in animals, made the urine almost immediately ammoniacal. You will also find, in Dr. Prout's work, that an ammoniacal state of the urine may be rapidly brought on by injuries of the back, from falls or bruises on the spine. It is, indeed, singular how quickly those profound functional lesions of the kidneys supervene on injuries of the spine, sometimes appearing in four or five days, sometimes sooner. Medical men have hitherto been in the habit of looking at this matter only in one point of view; they know that disease of the spine will produce disease of the kidneys, and here they stop; but it has been shown that the reverse of this may happen, and that renal disease may produce very remarkable lesions in the functions of the spine. Of this very curious occurrence we have many analogies in pathology. Thus, for instance, in several cases of cerebral disease, but chiefly in hydrocephalus, we have vomiting; here we have functional disease of the stomach depending on an affection of the brain. Take the reverse of this — observe the delirium which attends a case of gastro-enteritis — here you have the functions of the brain deranged in a most remarkable manner, and this produced by sympathy with an inflamed mucous membrane. The truth is, that in the spine and kidney, as well as in various other parts of the system, we have two organs which are so closely connected by sympathy, that disease of one will bring on serous functional lesion of the other.

Observe, then, the great importance of these inquiries. When you meet with a case of paraplegia, you are not at once to conclude that it depends on disease of the spine, or caries of the vertebræ. You must carefully investigate its history, and ascertain whether it may be referred to either of these causes, or whether it may not rather depend on disease of the kidneys. That it may depend on the latter cause is now established, for the cases are too numerous for us to suppose the complication accidental. You will observe the importance of making an accurate diagnosis, when you consider that this point will most materially influence your treatment. In the one case, your treatment will be directed to the bones and cartilages of the spine; in the next to the spinal cord itself; and, lastly, to the kidney, a parenchymatous organ, to which there is a great determination of blood. No one will venture to assert that the principles of treatment in each of these cases are the same; and the chances are, that, if you do not make a correct diagnosis, you will practise improperly and without success. I have now seen a number of these cases, but there were only two of this description

in which I was fortunate enough to obtain a *post mortem* examination. I cannot say that my dissection exhibited remarkable disease of the kidneys (they were large and very vascular), but, from the many points of resemblance they bore to Mr. Stanley's cases, I was led to conclude, that if they were not examples of actual chronic disease of the kidney, they were cases of lesion of function in the spine, unaccompanied by any organic change to account for the symptoms. I shall briefly detail these cases: the first was that of an unfortunate man from the country, who was discovered by two friends of mine under peculiar circumstances. While on an excursion, they were requested to visit a poor man who was lying ill at a remote farm-house. They heard he had been labouring under a dropsical affection for a long time, and had been treated for ascites. On arriving at the cottage, they found the man lying in bed, with his abdomen very much enlarged; and, on further investigation, discovered that he was quite paralytic of the lower extremities. On examining the belly more particularly, they found that the swelling was produced, not by ascites, but by *an enormously distended bladder*. He had, also, stillicidium urinæ, with paralysis of the bladder; and this having been mistaken, by the medical practitioner who attended him, for suppression of urine, he had prescribed diuretics, and continued this plan of treatment for some weeks, totally overlooking the paralysis of the bladder. As little or nothing could be done for him in the remote situation in which he lived, it was determined to send him up by easy stages to Dublin, and procure him admission at one of the public hospitals. On his arrival, he was received at the Meath Hospital; and, when I visited the wards next day, I found that he was quite paralytic of both lower extremities, that the bladder was in the state above described, and that his health had suffered considerably, and that bed-sores had formed on his back, and were increased by his journey. I prescribed cupping and blistering, which were productive of some slight relief; but in the space of a few days he began to exhibit symptoms of low typhus, as if from the absorption of pus, and sank rapidly. On examining his body, we could not detect any traces of disease in the bones or cartilages of the spine; neither did the cord, or its membranes, present any marks of organic lesion, except that towards its lower portion, where it begins to spread out into the cauda equina, it was perhaps a little softer than natural. I regret very much that I did not note the circumstances of this case more fully; but, as far as my recollection of it goes, the general features were as I have just mentioned. I had another case, some time since, in the Meath Hospital, in which the following circumstances were observed: — The patient, a labouring man, generally employed about the quays, was brought into the hospital with paraplegia of some standing. The first symptom in his case belonged not to the spine, but to the urinary system; he had had an attack of gonorrhœa, for which he had used stimulants and balsams; and, in some weeks after, without any injury to the spine,

he lost the use of his lower extremities. During his stay in the hospital, the urine was intensely ammoniacal. On examining his body after death, we could not discover any disease of the bones or spinal marrow. A layer of substance, resembling fat, or organized lymph, was found lying on the theca of the spinal marrow, but it was so very small as to be scarcely sufficient to account for the symptoms. The kidneys were pale, flabby, and without any vascularity, but did not present any marked traces of organic lesion.

Here, then, were two cases which, before the publication of Mr. Stanley's paper, would be considered as examples of organic disease of the spinal cord, or its investments; and yet, on dissection, we can find nothing to establish this opinion; and, in the last one, the first affection was of the urinary system.

Is it possible that a *functional* disease of the urinary system may produce also a *functional* disease of the spinal cord?

With respect to the diagnosis of caries of the spine, I wish to make a few observations. The diagnosis where there is distortion of the spine is extremely easy, but this does not hold where the caries is accompanied by distortion. Let us inquire. Are there any circumstances which would enable us to arrive at the diagnosis of caries without distortion? One symptom, not observed, as far as I can see, in paralysis, *connected with disease of the kidney*, is that the patient feels exquisite pain on motion. This is an exceedingly common symptom in caries of the vertebræ, but I am not aware that it occurs in cases where the disease is situated in the kidney, or the spinal cord itself. There is another remarkable circumstance: — When the patient attempts to move, he often feels a cracking sensation in the affected portion of the spine; and this has not only been observed by the patient himself, but is also perceptible to his medical attendants. When this occurs, it may, I think, be looked upon as a diagnostic symptom. The exquisite pain on motion, the tenderness of the spine on pressure, and the crackling sensation, these might be sufficient to make the diagnosis of caries of the vertebræ, even in cases where there was no distortion. But if you had a case of paralysis of motion and sensation of the lower extremities, and if these symptoms came on without any injury of the spine — if there was little or no tenderness on pressure — if the patient felt scarcely any pain in turning or moving, and if he had at the same time symptoms of disease of the kidney or bladder, and ammoniacal urine — under these circumstances the great probability would be, that it was not a case of caries of the vertebræ, or original disease of the spinal cord, or its investments, but a lesion of function of the spine, connected with organic or functional derangement of the kidneys. It must be acknowledged, however, that the diagnosis of this affection is rather obscure. The circumstances which I have just mentioned, might enable you to get rid of the opinion that it was caries of the vertebræ or organic disease of the spinal cord, and that it was probably such a case as Mr. Stanley has described; and if you could arrive at this dia-

gnosis at an early period of the case, it would be a matter of great importance. By doing this, you would then be aware that you had to deal with an inflammatory affection of a highly vascular organ; you would not be led away from the real state of the case, or waste time in treatment calculated to stimulate the spine, or remove disease of the vertebræ. Your plan would be simple, and your treatment defined, and all your efforts would be directed towards removing the disease of the kidneys. You will easily perceive that diagnosis is here of vast importance; unfortunately, it is still involved in obscurity.

The prognosis of cases of paraplegia, when once complete paralysis is established, should be always unfavourable. The fact of paralysis occurring, is sufficient in itself to prove the existence of extensive disease in most cases. There may be, however, some cases susceptible of cure, and this particularly occurs in young females, in whom a perfect cure has been frequently accomplished by the use of stimulant embrocations to the loins. I have seen one case of this kind, in which the patient was paraplegic for a year and a half, cured by the application of hot oil of turpentine over the lower part of the spine. Simple as the treatment may appear in this case, its success was rapid and complete. Mr. Crampton has mentioned to me the particulars of another case, in which the patient's limbs were quite rigid, and could not be moved without great difficulty; in this case, complete relief was obtained by applying Pearson's liniment over the lower part of the spine. This liniment produced powerful counter-irritation, and an eruption of bullæ over the body, which were speedily followed by relief. The patient is now in the enjoyment of perfect health; and since the period of her cure, which is now better than six years ago, has had no return of the disease.

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[In confirmation of the occasional origin of paraplegia from visceral disease, as stated in the preceding lecture, the following facts are added: Dr. Graves (*Clinical Lectures*) relates the case of a man who had, consequent on exposure to cold, wet and fatigue, become affected with pain and weakness of the lower extremities. During the time his legs and back were getting weak, he was obliged to pass water about three times in an hour, which he did with pain and tenesmus. At the time of his admission into the hospital, he appeared somewhat broken down in his general health; he was pale, emaciated, and laboured under derangement of his digestive organs. He suffered from occasional chills, succeeded by heats and sweating, which occurred at irregular periods; he, also, laboured under micturition, dysuria, and the stream of urine was much diminished. The pain in his back was very severe, and he lost the use of his limbs, but not completely, for he could support himself, and even walk a little, with the aid of two sticks.

His treatment was as follows: — First, cupping over the loins, then moxæ in the same situation; attention to his digestive organs,

diluents and opiates for the urethral symptoms. On the tenth day after his admission, a very close stricture was found to exist in the membranous portion of the urethra. A small cat-gut bougie of double length was introduced, so that one-half of it projected from the meatus; over this was slided a small gum-elastic catheter of ordinary length, and open at each end, until it traversed the stricture, and reached the bladder; the cat-gut bougie was then withdrawn, and the gum-elastic catheter secured. A little constitutional disturbance followed, but soon subsided, and in a few days gum-elastic catheters of a much increased size were introduced with facility.

"*A very remarkable amendment took place in his back and lower extremities, in a very few days after the first introduction of the instrument: in fact it was almost sudden.* Warm baths, friction to his limbs, &c., completed his cure." He was discharged on the 25th February (admission on the 16th January), at which time the power of his lower limbs was perfectly restored, and the symptoms affecting the urinary system had disappeared. This case was reported to Dr. Graves by Dr. Hutton, under whose care the patient was placed. It proves, as Dr. G. remarks, "that urethral irritation may, as well as inflammation of the kidneys, give rise to paraplegia." This man had gonorrhœa, followed by gleet, from which he recovered five years before his attack of paraplegia.

Several examples have been witnessed by Dr. Graves of more or less complete loss of power of the lower extremities, supervening on inflammation of the gastro-intestinal mucous surface.

Paraplegia sometimes occurs during the course of a fever. Here, as Dr. Graves remarks, the other sufferings of the patient, and his general debility, attract our notice so exclusively, that the paralysis entirely escapes notice until convalescence is established—until, in fact, the patient wishes to support himself on his legs. He then finds, much to his surprise, that his limbs yield under him. This appears to him the more extraordinary on account of his having recovered a good deal of strength in his upper extremities. Mr. Carmichael has seen several cases of paraplegia following the remittent gastric fever of children, totally unconnected with spinal disease. Such an occurrence is most usual in children of a scrofulous temperament, and is seldom, Dr. Graves thinks, remedied either by time or medicine. A remarkable exception to this unfavourable prognosis has recently occurred in a young patient of mine, aged nine years. This boy, who is of a scrofulous habit, has had bad health from infancy; at first bowel complaints, long and exhausting, then bronchial disease, also protracted and harassing, and enlarged tonsils. To these succeeded a posterior curvature of the first dorsal vertebræ; and about ten months ago an inability to walk well and a leaning to one side. He was subjected at this time to regular treatment—a horizontal posture, counter-irritation along the spine, and took the hydriodate of iron and laxatives internally. Ere long he lost the use of his lower limbs entirely, and continued thus

helpless throughout the winter — with, at times, a partial stoppage of urine, and sometimes involuntary discharges of fæces, and sometimes constipation. During this period a scrofulous tumour appeared on the left side of his neck, which eventually suppurated, and has continued to discharge up to the present date (June). Another but smaller tumour on the opposite side soon reached the suppurative stage, some time after the other was emptied, and has left a small opening, from which oozes out a fluid. In the early part of the spring this boy recovered the use of his limbs so as to be able to perform the movements of flexion and extension in bed or on a sofa; and since then, and for about two months past, is able to stand with the aid of some support. That of which he chiefly makes use is the spine-cart, in which he now walks with tolerable ease. In addition to the other symptoms the patient had, during much of the winter, a troublesome cough and hectic with night sweats. His chief and almost sole medicine, which he has taken for some months past, is the sulphate of quinine, and occasionally an alkaline mixture with a little laudanum for his cough, which is now much better, and the hectic has in a great measure disappeared. After the cessation of the use of irritating ointments, and of blisters applied to the spine, the external treatment for a long time past, and anterior to the restoration of muscular power of the lower limbs, has been friction with a flannel, and sometimes the hand, and rubbing in of the common volatile or soap liniment on the spine and lower limbs.

Without adopting, in all their entireness, the opinions of Dr. Graves, we ought to imitate his practice more frequently than we do, by employing appropriate measures for the relief of the pain in the back, which is so common in the beginning of fever. "When headache is the prominent feature of the first stage of fever, how few will omit bleeding, leeching, cupping, cold or hot applications, &c. When, on the contrary, the lumbar spinal marrow is the seat of the congestion, how generally do practitioners neglect the application of topical bleeding and other appropriate remedies. Were such neglect of less frequent occurrence, it is probable that paraplegia after fever would not probably be met with."

Partial paralysis, as that of a limb, sometimes ensues on irritation transmitted from some part of the surface. Thus, in a case of erysipelas of the calf and inside of the right leg, described by Dr. Graves, which yielded to appropriate treatment, there was for some time a loss of power of motion in the affected limb. Sometimes the reverse happens, and pressure, as of the head on the arm in sleeping, has been followed by a palsy of this limb of several years' duration; and in another case a fall on the left hip and trochanter produced a permanently paralytic state of the left lower extremity. No injury of the spine could be detected, and there was no numbness, pain, or formication, in the affected limb.

In the views of treatment of paraplegia supervening on visceral disease laid down by Dr. Graves, I fully coincide. He says that he

has never seen any benefit derived from applications to the spine, and that the application of blisters or issues over the back or loins does not appear to be productive of the least good effect. He is in the habit of applying his local remedies to the legs and thighs, selecting those parts in which the greatest sensibility exists. Confirmatory of the propriety of this course is a circumstance which occurred in the case of my little patient whose case I have already described. At a time when he was completely paraplegic and unable to move either of his lower limbs except by grasping one or other of them with his hands, and dragging it up a little from the bed, moderate friction of the skin of the lower part of the leg would often be followed by a regular but involuntary contraction of the muscles both of the leg and thigh, so that the knee was partially bent, and the thigh partially flexed on the pelvis. This fact encouraged me to urge a continuance of the frictions, which had been before regularly practised, of the feet and legs.

Dr. Graves generally keeps up a succession of blisters along the inside of the legs, and over the anterior and inner part of the thighs, aided by the use of liniments of a stimulating kind applied to the cutaneous surface of these parts. The two internal remedies on which he relies most, are strychnia and sulphur; the former of these he continues until some sensible effect on the system is produced, when he omits its farther use and has recourse to the exhibition of sulphur in the form of an electuary. Much, also, will be accomplished by the external use of sulphur, and of course of sulphur water, and hence cases of paraplegia have been materially benefited by the external use, combined with drinking them, of the waters of Harrogate, Baréges, &c., and of our own White Sulphur in Virginia.—B.]

LECTURE XCII.

Paralysis, sudden, from abscess of the brain—Curious case of paralysis without effusion—Previous symptoms of—Demonstration of the cellular tissue of the brain—Compressibility of the brain—Inaccuracy of the opinions of Drs. Abercrombie and Clutterbuck—Pathological states—Arachnitis without delirium—Traumatic apoplexy—Case of paralysis of the portio dura—Peculiar appearance of the affected side of the face—Use of the electro-puncturation—Bad effects from—Mechanical support of paralysed parts—Neuroses, active and passive—General pathology of—Principles of diagnosis—Case of neuralgic liver—Neurosis from moral causes.

Before I leave the subject of organic affections of the brain, I wish to exhibit a few preparations illustrative of some of the principal diseases dwelt on in the preceding lectures. You will recollect that, in a former lecture, I alluded particularly to the question, how far we are able to judge of the existence of apoplectic effusion by the *sudden* occurrence of an attack of paralysis. I endeavoured then to impress upon you that we may have sudden paralysis from other causes, as well as apoplectic effusion, and stated that

there were numerous cases of sudden paralysis, with disorganization of the brain, on record, depending, not on apoplectic effusion, but on circumscribed abscess of the brain; and that, consequently, the diagnosis of apoplectic effusion from *suddenness* of attack was only valuable when it came on unpreceded by symptoms of local disease of the brain. I alluded to a remarkable case of aneurism of the arteria innominata, in which the patient, soon after the date of his admission into the hospital, had become suddenly hemiplegic. This was a case in which one would be led to expect an effusion of blood into the brain, as the circulation of the head was evidently impeded by the pressure of the aneurismal tumour on the great veins, and as there was a remarkable distension of the jugular and other superficial veins. Of the existence of the aneurism there was not the slightest doubt; the tumour could be felt pulsating below and above the clavicle on the right side, compressing the trachea, so as to cause stridulous breathing, and producing a varicose state of the veins of the neck by its pressure. We accordingly made the diagnosis of aneurism of the arch of the aorta, or of the arteria innominata. In this case two circumstances — the sudden paralysis of one side, and the obstruction to the circulation of the neck and head — would, as I have said before, lead to the supposition of an apoplectic effusion. On dissection, however, the paralysis was found to depend, not on this circumstance, but on the existence of a circumscribed abscess in the anterior part of the opposite hemisphere of the brain. I have the pleasure of exhibiting to you to-day this interesting and important preparation. It is too large to send round, but you can all inspect it after lecture. Here is the aorta from its commencement at the left ventricle — here is the enormous aneurism of the arteria innominata compressing the trachea — so that it has not only pushed it far to the left side, but it has flattened it in such a manner as to produce a curious alteration in the appearance of its musculo-membranous structure. The terminations of the rings of the trachea are brought close together, and the muscular parts are folded in between them. There is another circumstance here deserving of your notice: the right carotid, you see, is obliterated; it is interesting to connect this fact with the absence of true apoplectic effusion. The case altogether is a curious one, and presents two remarkable circumstances — great mechanical obstruction to the venous circulation of the head, and sudden paralysis *without effusion*. It is, however, to be remarked, that in this case, though the paralysis was sudden and unexpected, it was preceded by some symptoms of local disease of the brain. The patient had pain in the head and limbs of one side, accompanied by a sense of formication. These symptoms were remarked some days before the attack of paralysis, but their importance was not at that time thoroughly estimated, in consequence of a greater share of attention being directed to the aneurismal disease.

In this bottle, you have a specimen of that species of ramollissement which supervenes on local inflammation of the brain. We

have every reason, I think, to believe that when this disease occurs in the young, or in the adult, it is the result of an active inflammatory process; and that softening of the brain has in it nothing more specific or peculiar than softening of the liver or lungs from acute inflammation. Here, you see, is the disease — an irregular cavity filled with broken up cerebral matter, somewhat resembling cream in appearance and consistence. I may remark here, that it is in cases of this description that we are able to demonstrate the existence of the cellular membrane of the brain. This cellular membrane is extremely fine and delicate — so much so, indeed, that some anatomists of high authority have asserted that the brain possessed no interstitial cellular tissue. This preparation, however, gives a proof of the great light which pathology frequently throws on obscure points of anatomy and physiology; for, though the interstitial cellular tissue cannot be seen in the sound brain, we are able, in the preparation before us, to demonstrate its existence with certainty. It is, however, to be observed, that it is only in recent cases of ramollissement that this phenomenon can be examined with advantage; for, in those of long standing, the cellular membrane shares in the general destruction, more or less, and gives way. But if you get a case where the softening is recent, and then take the softened portion of the brain and expose it to the dropping of a filter, you will find that the soft cerebral matter will be gradually washed away, leaving behind it a delicate tissue; and in this way you can prove the existence of cellular membrane in the substance of the brain, like that of other parenchymatous organs.

Here is a specimen of apoplectic effusion: see how extensively the substance of the brain has been torn; the cavity formed in this way is, you will perceive, filled up with a large clot. Now, there is one consideration which strikes us at once, in looking at an effusion of this kind into the substance of the brain, whatever may be its situation or extent — and this is, *that the brain must be a very compressible organ.* Here we see the brain torn, a cavity of large size formed, and this completely filled with blood. Now, it is obvious that the rest of the brain must give way, in order to give room for the formation of this cavity. If, then, it be true that the brain is compressible, so far as to admit of the formation of a large cavity, it necessarily follows that, contrary to the opinion of Drs. Abercrombie and Clutterbuck, the quantity of blood in the brain may vary, and be greater at one time than another. These authors think that the quantity of blood circulating in the brain never varies, but here, you will perceive, we have a remarkable cavity; and it is plain that the rest of the brain must have yielded before it could be formed; and it follows, as a natural inference, that the brain must be compressible, and that, consequently, the quantity of blood contained may vary at different times. It may be argued against this, that the illustrative proof in this case is derived from a pathological condition, and that, under such circumstances, the

brain has room for the formation of a cavity, by the emptying of some of its vessels. Here, it is urged, is a cavity, but the emptying of the vessels of the brain compensate for it; thus room is found, and there is no increase in the quantity of blood circulating in the brain. This, however, I look upon as a mere *petitio principii;* nor have we any reason to think, that, in a case of apoplectic effusion, there is any corresponding emptying of the vessels, for dissection almost always shows a surcharged state of all the vessels. The result, then, in my opinion, is, that the brain is compressible, and may admit a larger quantity of blood at one time than it does at another. On this subject I advise you to consult Dr. Mackintosh's work on the *Practice of Physic*, and also the review of Dr. Clutterbuck's *Essay on Apoplexy*, in the London Cyclopædia of Practical Medicine, as given in the Dublin Medical Journal, vol. ii.

Here is another specimen. You see the brain, with a small clot in its substance about the size of a hazlenut. The patient in this case did not die suddenly; the clot has nearly lost the appearance of blood, and the processes of absorption were going on. I have got here another preparation illustrative of this effect on one of those effusions. I told you, in a former lecture, that in these cases one of two things occurred; either the clot was wholly absorbed, and a serous cyst left in its place, or it was not absorbed, and became to a certain extent organized; and that this might be the history of many of the anomalous tumours we meet with in the brain. Here is a clot fully as large as a walnut, in which no absorption has taken place, and you perceive it has been converted into a mass of a dense solid texture. You can easily conceive that the brain, having a clot of such a texture in its substance, could not easily recover its functions, and that the paralysis would be persistent. Here is another large apoplectic effusion, in which a certain degree of change has been produced; the clot, you see, has lost a good deal of its colour, and is not so red as in its recent state. Here is an excellent specimen of circumscribed abscess of the brain in the centre of one of the hemispheres. In this you can, to a certain degree, demonstrate the cellular membrane of the substance of the brain; but, if the preparation had been manipulated in the way I have mentioned, I have no doubt that it would exhibit it much better — that is, provided the abscess was of recent occurrence. If it should happen to be of long standing, the cellular membrane generally gives way, and you have nothing but a cavity filled with softened matter. This large preparation exhibits an enormous effusion on the surface of one of the hemispheres of the brain; it was the result of an injury of the head, and was accompanied by paralysis of the opposite side. It furnishes an example of what has been termed traumatic apoplexy. The other preparations on the table do not apply so immediately to the illustration of apoplectic effusions, and I shall pass them over.

Here is a preparation which I would draw your attention to, as

it belongs to a very remarkable case. I mentioned before, that, in certain cases of arachnitis, where the disease was chiefly situated at the base of the brain, it had been observed that there was seldom delirium. In this case the patient complained of pain along the base of the skull, which occasionally remitted and then returned with violence, and it was at first supposed to be neuralgic. He continued in this state for some time, having a recurrence of violent pain in the ear, temporal and mastoid regions, which lasted for several days; when, all of a sudden, without any preceding delirium, he became comatose, and died shortly afterwards. On dissection, the arachnoid covering of the brain was found to be in a state of extensive disease over the inferior surface of the anterior lobe, and towards the posterior part of the base of the brain. Here we had a case of extensive and fatal arachnitis, with total absence of delirium.

When speaking of the employment of galvano-puncturation in the local treatment of paralytic affections, I stated that the case in which the most decided benefit was observed occurred in paralysis of one side of the face, apparently unconnected with actual disease of the brain, and of a local nature. This is in accordance with what has been observed with respect to the efficacy of all local measures employed in the treatment of paralysis; and, accordingly, the more the affection is purely of the nerves of the part, the more satisfactory should be the results of galvanism. I shall read for you the notes of this case, and I am happy to have it in my power to lay before you two excellent drawings of the patient's appearance before and after the use of the galvanic battery, from the pencil of my friend, Mr. Berthon.

"A bricklayer, named T. Hogan, got an attack of erysipelas of one side of the face, accompanied by a feeling of pain and stiffness between the angle of the jaw and mastoid process of the right side. This was followed by an attack of paralysis of the right side of the face, and he presented himself for admission at the Meath Hospital in the following state: — The features at the right side of the face are blank, unmeaning, and motionless, while those of the left side retain their natural cast, except that their lines are more strongly marked, and the angle of the mouth is drawn upwards and towards the left side to a considerable extent. The skin of the right side of the forehead is smooth, that of the left furrowed and puckered. The lids of the right eye are half closed, and he has not the power of moving the upper one. When desired to close his eyelids, the eyeball rolls upwards, and the transparent cornea is carried behind the curtain of the upper lid. By this movement the patient excluded all objects, and was under the impression that he had shut his eye. The lower lid hangs down, and is partly everted, exposing the conjunctiva, and allowing the tears to trickle down the cheek. When he breathes, the right cheek is puffed out; it becomes still more distended by an attempt at blowing; and, when attempting to drink, a quantity of the fluid escapes at the

right angle of the mouth. On being requested to draw the right angle of the mouth towards the corresponding ear, not the slightest movement was made, except by the muscles of the opposite side. In masticating his food, the morsel gets between the cheek and gum of the right side, and he is obliged to put in his finger to dislodge it. Sensation on the paralysed side is unimpaired, and there is no deafness, alteration of taste, or loss of vision. With respect to the muscular functions of the tongue, they appear to have suffered no injury, and he can direct it with facility to either side. Here was a fact to show that the paralysis of the face in this instance had no connexion with cerebral disease. In the majority of cases of paralysis of one side of the face, from diseases of the brain, there is lesion of motion of the tongue, but here it was in its natural condition. There is a slight degree of thickness of speech, which can be remedied by supporting the paralysed cheek with the palm of his hand. He complains of a feeling of stiffness in the jaws, and cannot open his mouth more than what would be capable of admitting a teaspoon. He has had some tenderness over the mastoid process. He can press hard substances with his teeth; and the temporal, pterygoid, and masseter muscles seem to be as strong on the paralysed as they are on the sound side. He can move the lower jaw so as to incline the symphysis to either side, but more to the left than to the right. His general health is good, and his bowels regular." I shall hand round the drawings of this case for your inspection. You will observe the peculiar appearance of the left side of the face, with the mouth drawn upwards, and the skin of the nose and forehead thrown into deep wrinkles. There can be no doubt that the exciting cause of the paralysis in this instance was connected with the erysipelas of the face. He had no symptoms of any cerebral affection, and the paralysis was limited to those muscles which are supplied by the seventh pair of nerves. The tongue was quite unimpaired in its motions, and there was no lesion of taste, hearing, or smell. It was, in fact, a case of purely local paralysis, and bore a decided analogy to those cases which have been so accurately described by Sir Charles Bell as depending on an affection of the seventh pair of nerves.

The treatment of this case was in accordance with the views already detailed; the diagnosis was paralysis of the seventh nerve, and the treatment founded on this diagnosis proved eminently successful. The first thing done was to apply a few leeches to the ramus of the jaw; we then used stimulating applications, and he used for some time the liniment, camphoræ compos. with extract of belladonna. After this he was put on strychnine, which did him some good; but there was so great a susceptibility of its action, that we were ultimately obliged to give it up. The last remedy employed was electro-puncturation, under the use of which he improved rapidly. On the 5th of March the galvanic battery was first applied; the needles at that time were inserted — one in front of the ear, and the other near the symphysis of the chin; subse-

quently they were inserted in various parts of the right side of the face, following the different branches of the portio dura. On the first application of the galvanic influence, he had spasmodic twitches of the paralysed muscles, and soon afterwards he began to complain of a burning sensation in the cheek and pain in the head. Here, it would appear that headache was the result of the proximity of the stimulus to the brain. On the 11th, the symptoms were nearly the same, and his general health continued to improve. On the 15th, the application of the galvanic influence was followed by severe headache, which lasted for half an hour. On the 19th, his appearance was much improved, and the galvanic battery was not used. On the 20th, it was again applied, and in an hour afterwards he had rigors and slight headache. On the 21st, after using the battery, he had rigors again, followed by headache and a pricking sensation in the cheek. On the 24th, he left the hospital in a remarkably improved state. Expression had returned to the side of the face which had been previously unmeaning and blank; the furrows which had deformed the opposite side were removed, the thickness of speech diminished, and the paralysis of the buccinator had been so far relieved that he was able to manage soft articles of food without being under the necessity of removing them from between the cheek and gum with his finger. In this case we employed an adjuvant which should be mentioned; we supported the paralysed parts for some days with strips of adhesive plaster, to restore the position of the mouth. This was done on the principle recommended by Dr. Pemberton, in the treatment of paralysis of the forearm and hand from painters' colic. By applying strips of plaster near the angle of the mouth, and drawing them back and fixing them behind the ear, we endeavoured to counteract the preponderating antagonism of the muscles of the opposite side. For the report of this case, I am indebted to Mr. K. Ellison, of Liverpool, who had the charge of the patient in the Meath Hospital, a gentleman whose talents are only equalled by his untiring zeal in the study of pathological medicine.

The foregoing case is interesting in two points of view; first, as to its peculiar phenomena, and, in the next place, as to the success of local treatment. It also shows that we may go too far with electro-puncturation, particularly when it is applied to parts which are situated close to the brain. You recollect that, in Mr. Hamilton's case of amaurosis, three pairs of plates were capable of producing a degree of stunning and insensibility which lasted for some time. In this case the rigors and headache showed that the galvanic fluid had a powerful effect, and would lead us to be cautious in using it too freely, where the parts to which it is to be applied are situated in the vicinity of the brain.

We have now taken a very brief sketch of some of the most important organic affections of the brain; but, in the study of disease, we constantly meet with a vast number of cases presenting the most extraordinary nervous phenomena, and yet we are unable to

discover, by the closest pathological investigation, any appreciable lesion of the nerves, spinal cord, or brain. These are the class of diseases which have received the name of *neuroses*. We find, in most of these affections, a remarkable alteration in the nervous functions without any perceptible or constant organic change; we find, too, that this alteration may be connected with an exaltation or a depression of the nervous power; and from this circumstance results the division of neurotic affections into active and passive — active where the nervous power is elevated, and passive where it is depressed. The spasms which accompany an attack of flatulent colic, the exquisite pain of tic douloureux, and the wild intellectual exaltation of mania, are examples of active neuroses. A patient in the second stage of painters' colic will have paralysis of motion and sensation of the forearm; there is here an obliteration, or at least a diminution, of the nervous function, and the disease furnishes us with an example of passive neurosis.

Of these two classes the active are certainly the most interesting in many points of view. We find, under the class of active neuroses, some of the most extraordinary diseases to which the human body is subject; all the different varieties of spasmodic affections — chorea, epilepsy, tetanus, hydrophobia, tic douloureux, hysteria, and a host of others, come under this denomination. It is a melancholy reflection then, that, in the present state of medical science, we are not only ignorant of the ultimate cause of most of these diseases, but even of the causes of the variation in their phenomena.

You will recollect that, in a former lecture, I threw out a conjecture on this point, and stated that there might be changes of an organic nature connected with these affections, not appreciable by any mode of investigation at present known: and that it was possible that there might be a change in the nervous substance, quite independent of any addition or subtraction from the component sum of their organic molecules, but in all probability connected with a new and different arrangement of these molecules. The analogy in this instance is drawn from chemistry, and, I think, may obtain here, as well as in the phenomena of Isomerism in inorganic bodies. You are aware that many bodies, which seem to present exactly the same component elements, are found to be extremely different in their properties, and that this difference has been accounted for by supposing that it depends, not on any addition or subtraction of the component molecules, but on *some difference in their mode of arrangement*. Now, if this happens in the case of inorganic bodies, there is no reason why it might not also occur in organic substances; and, if so, we may understand why a state of the brain and nerves, which appears to us to be normal and healthy, may still be essentially different, and give rise to the most extraordinary phenomena.

I shall not detain you with any further remarks on this subject— it is too obscure to be treated of in a course of lectures on the prac-

tice of medicine; let us turn to the consideration of the actual state of our knowledge on the subject of nervous affections. In the first place, we know that in the neuroses there is no change discoverable which could account for the symptoms; and that, if we examine the nervous centres to explain the phenomena of paralysis in one instance, of epilepsy in another, of mania in a third, of hydrophobia in a fourth, and so on, the most minute investigations will not, in the majority of cases, point out any deviation from the healthy condition sufficient to account for the phenomena. We find, too, not only that the state of the brain does not present any constant difference in the foregoing diseases, but also that there is often not the slightest trace of anything like inflammatory action — a fact borne out by the most extensive experience — and showing that treatment which would relieve ordinary cases of inflammation of the brain will here prove useless. There is one curious circumstance connected with these neuroses which you should be aware of, and this is — where the patient, after suffering from a nervous affection for a long time, dies, you may find organic disease on dissection; but here there appears reason to believe that organic changes of the cerebro-spinal centres, taken in the proper acceptation of the term, *are, in reality, the result of some state of these centres which existed previous to the attack, and was the cause of all the nervous phenomena.* We arrive at this conclusion for two reasons: first, because such changes are by no means constant; and secondly, because they are only found where disease has been a long time in existence.

Nervous phenomena, independent of organic lesion, have been divided into two classes — namely, neuroses of the nerves of animal, and neuroses of the nerves of organic, life. With respect to animal life, or the life of relation, we may have its neurotic affections of an active or passive kind; we may have pains, spasms, and exaltation of intellect, under the active form: under the passive, we may have extinction of muscular motion, sense, and the intellectual functions — the life of the individual being still preserved. With respect to the system of organic life, it would appear that, if we are to speak in general terms, we must admit that there is no passive paralysis of the nerves of organic life, they being liable to the active neuroses alone — for a passive neurosis of the ganglionic system implies death; yet, to a *certain degree*, as I have formerly stated, such a passive neurosis might exist in the visceral nerves. But we may have the phenomena of the active neuroses in all parts of the body, whether muscular or visceral. It is a singular fact, that in some visceral diseases we have signs of high exaltation of the nervous functions of the parts, in others not. Why is this the case? I think it must chiefly depend on the mode or degree of excitability of the brain, which is very different in different persons. There is no known organic difference between the gastritis with delirium, and the gastritis of a man in his senses: nor is there any difference between the hepatitis of a man of bilious, and the hepatitis of a man

of nervous temperament: and we have, in order to explain the variety of the symptoms, to refer to some original conformation or mode of excitability of the sentient centre. Whether this difference depends on an original organization, or on excess or deficiency of parts, or on phenomena similar to those of Isomerism, we know not. As the result of experience, we are forced to admit that these phenomena have no necessary connection with the inflammation of the suffering part, or of the brain; and this proposition applies to the great majority of cases which are called nervous. Experience has also proved the truth of this from the results of treatment — for it has proved that the most successful treatment is that which is by no means calculated to remove inflammation (in its ordinary acceptation), either from the brain or from the suffering parts. The progress and duration of these cases, also, tend to prove the same thing; for, if we were to measure the degree of inflammation by the amount of pain suffered, it would be of an intense character and rapid fatality; and yet we find that, notwithstanding the violence of the symptoms, these diseases may go on for a number of years.

It is quite plain, then, that the pathological condition of a neurosis is not inflammation. Now, one of the most common mistakes in the practice of medicine is the taking these neuroses for cases of local inflammation; and this, I need not tell you, is frequently productive of most distressing consequences. There is one point connected with those violent nervous attacks which leads to a persistence in this error; and this is, that local antiphlogistic treatment gives temporary relief, although, in the majority of instances, this is of very brief duration, and the pain and other symptoms return, leaving the patient worse than he was before. From the fact of temporary alleviation following depleting means, however, the idea of inflammation gets into the practitioner's mind, and the patient himself is favourably disposed to that plan of treatment from which he has obtained a momentary relief. The consequence is, that a system of general and local depletion is continued, until a period arrives when the nervous excitability gets to an alarming height. Now, is there any circumstance, or class of circumstances, which would lead to the diagnosis of these affections? I feel certain that in many instances this must be a matter of some difficulty. By a careful study of the symptoms, however, you will, in most cases, be able to arrive at the truth. The first thing to which I would direct your attention, in studying the diagnosis of such cases, is *the extreme violence of the pain*. Now, this intensity of suffering seldom occurs in cases of inflammation; and it is a curious fact, that the most painful diseases are the non-inflammatory. The agonies of a patient labouring under neuralgia of the liver, or of the left side, or under tic douloureux, are dreadful; the pain is far more intense than in any case of inflammation: and yet, notwithstanding all this excess and persistence of suffering, we do not see that the duration of life is necessarily curtailed. In the next place,

you will observe that these attacks frequently recur, and that, though long-continued and violent, they do not affect the patient's life, which would not be the case if they were connected with inflammatory action. If you add to all these circumstances a knowledge of the constitution, temperament, and habits of the patient, you will have still clearer notions. But there are other circumstances besides these to guide you. In the majority of cases, you will find that all the local and general signs of inflammation, with the exception of pain, are absent. A female, labouring under neuralgia of the liver, will have frightful pains in the right hypochondrium, and yet, if you examine her, you find that she has little or no hepatic derangement, no tumour in the region of the liver, no derangement of the digestive system, and (though the disease has lasted for years) no dropsy, and in many cases no appearance of jaundice. She has no fever, thirst, or loss of appetite; her tongue is clean, her complexion clear, her stools natural, and her pulse soft. All these circumstances tend to show that, however violent the pain may be, it has no connexion with inflammation. You will be assisted further in your diagnosis, by finding that the access and cessation of these attacks are equally sudden and unexpected — two characters which do not belong to organic diseases. The quick supervention and sudden cessation of these diseases should lead you to suspect that they were not inflammatory. It may happen, in cases of inflammation, that pain may come on suddenly, and as rapidly cease; but, though it may come and go in a brief space of time, still you will find that lesion of function or structure remains. Thus, in a case of pleuro-pneumonia, the pain of the side may cease suddenly under treatment; but the stethoscope informs you that the layers of the pleura do not as yet glide freely on each other, and that there is some obstruction still to the free passage of air into the air vesicles. There is also another point. When we come to inquire into the exciting causes of these neuroses, we observe that they are most generally found to depend upon various circumstances connected with improper nutrition and with moral influences. Of these two classes of causes, the latter, though perhaps not the most numerous, are by far the most remarkable. A violent neurosis may be brought on in a single instant by moral causes. A nervous female, in apparent good health, may, from a sudden fright or fit of passion, get an instantaneous attack of neuralgia of the liver, and be thrown into a state of intolerable agony. Lastly, you will be greatly assisted in these cases by a knowledge of their history and *previous treatment.* What you will generally find is, that the patient has gone through a long and harassing course of general and local antiphlogistic treatment. The failure of this treatment will be of great value in guiding you to a correct diagnosis; and you will be further confirmed in this view of the case, by finding that the treatment which has the power of relieving or curing consists in improving the state of the whole system by the use of tonic, and, in many cases, of stimulant remedies. These observations will apply to almost all cases of purely nervous affections.

LECTURE XCIII.

NEURALGIC AFFECTIONS—Principles of treatment of—Connection with organic disease—Neuralgia of the liver—Treatment—Hemicrania—Treatment—Use of iron, quinine, and opium—Endermic method of using opium—Tic douloureux—Opinions of Sir C. Bell—Remarkable case related by—Inflammation of frontal sinuses—Violent symptoms—Mr. Crampton's treatment—Affections of the fifth and seventh nerves in cases of cerebral disease—Neuralgia of the side—Researches of Lombard and Brande on the effect of nitrate of silver—Injury to the skin.

TO-DAY I purpose to speak of some of the general principles connected with the treatment of neuralgic affections; and here I beg leave to remind you, that we mean by neuralgic affections an exaltation of the nervous sensibility independent, *quoad* its production, of any organic disease *which we can detect* in the nerves, brain, or spinal cord. There is no proposition better proved than this, that the phenomena of nervous affections are not the same as those of inflammatory diseases; everything tends to prove it, whether we look to the history and symptoms of the case, the results of treatment, or the appearances seen on dissection.

As the nervous system is diffused all over the body, and as there is no part of the system which does not, under certain circumstances, exhibit indications of sensibility, it follows that we may have neuralgic pains in any of the component tissues. Still it is remarkable, that neuralgic affections are much more frequent in some parts than in others; and we find that, of all parts of the nervous system, the superficial nerves are those which are most commonly affected. With respect to the nervous affections of the viscera, we know very little as to their exact seat, but it has been generally observed that the pain is situated in the situations of the plexuses of the great sympathetic.

In entering upon the principles which should regulate the treatment of neuralgic diseases, I have to remark that they are but slighty modified by their situation; in fact, it may be stated generally, that the same principles of treatment apply, no matter where the disease may be situated. But are we to consider this subject as totally apart and having no connection with the occurrence of inflammatory or organic disease? If we did so, we should get but a limited and erroneous view of the matter. I have told you before, that in long-continued cases of functional disease organic alterations were very apt to take place. The reverse of this proposition also is true, that organic affections may precede an attack of nervous symptoms; in other words, you may have cases presenting, at first, phenomena amenable to antiphlogistic treatment, and yet a period will arrive when new symptoms occur, and this mode of treatment will be no longer applicable. This is of importance in the practice of medicine, for if, in such a case, you persevere in the use of depleting measures, you will affect nothing towards the removal

of distressing symptoms, and may do your patient's constitution much injury. A common example of this is, where a person receives some local injury, as, for instance, a blow on the cheek. This is followed by all the symptoms of inflammation, as pain, swelling, heat, redness, &c. Well, then, you have a case of local inflammation to deal with, and you must treat it as such.. But a period may arrive when, the heat, swelling and other symptoms of an inflammatory affection subsiding, the pain alone continues. Here the pain may be purely nervous; and if you were to go on leeching, purging, and depleting your patient, you would not only lose your time, but in all probability do mischief. Here, as in many other cases, we have local inflammation followed by an active neurosis. You remember, when speaking of hepatitis, I remarked that many persons were subject to pains in the region of the liver, *independent of any known organic disease.* I also drew your attention to the fact, that after the symptoms of hepatitis are removed, the pain sometimes continues, having no longer any connection with organic disease, and taking on the character of a neurosis. You will see of what importance this is when you reflect on the mischief done to such patients by persevering in bleeding, blistering, and the use of mercury, when the disease is amenable, not to this, but to a plan of treatment calculated to remove the neuralgia of the liver. It is the same thing with respect to the mammæ, injuries of which are frequently followed by severe neuralgic affections. In the case of the heart, it sometimes happens that, after an attack of pericarditis, the patient will be subject to pain in that region, which may continue for years. Dr. Bright gives a very remarkable case of neuralgia which supervened on the disappearance of a cutaneous affection. All these facts tend to show, *that the mere preëxistence of local inflammation in any individual case does not prove that the pain is not neuralgic*, and hence it is plain that in such a case it might be improper to persevere in the treatment used for local inflammation. This persisting in the taking of a neuralgic pain for the continuance of inflammatory or organic disease is a common error, and often productive of the most frightful consequences. Without a careful consideration of such cases, you will fall constantly into error. Never forget that, although neuralgia may be the first and sole affection, yet that it is often combined with organic disease, which it may precede, accompany, or follow.

One of the most common forms of neuralgia which you will meet with in private practice, is what has been termed *hemicrania*, the chief symptom of which is violent pain in one side of the head and face. The symptoms are exceedingly violent; there is a high degree of exaltation in the sensibility of the surface of the face; the eye is exquisitely sensible to light, and the ear to sound. The patient is very much prostrated, and his spirits depressed, and the slightest cause is sufficient to bring on an attack of pain. In some cases the pain is constant, in some remittent, in others intermittent. The sensibility is deranged only at one side of the head and face,

and the pain seldom extends beyond the median line. As far as we know of this affection, it seems to depend on some morbid state, either of the sentient extremities of the fifth nerve, or of that portion of the brain which receives its impressions.

In cases of hemicrania we may have symptoms existing elsewhere, and this leads us to the consideration of the exciting causes. These will be often found to depend on deranged digestion. Here the irritation is reflected through the sympathetic system to the brain and sentient branches of the fifth pair, for there exists between these two nerves a very close and remarkable sympathy. Thus we frequently observe, that tic douloureux, as well as hemicrania, are the result of some injury or irritation of those parts to which the ganglionic nerves are distributed. In treating a case of hemicrania, then, you must inquire whether there be any visceral irritation present, and remove it as soon as possible. You must also carefully inspect the teeth and gums, for a carious tooth or a diseased gum will prove the exciting cause of an attack. I have seen many cases of hemicrania where the patient was subjected to a variety of treatment without success, and where complete relief was obtained by the simple process of extracting a carious tooth. It is a very curious fact, that in those instances the pain was referred, not to the diseased tooth, but to the whole surface of the face. Cases of this kind are given in which the pain lasted for many years, resisting every form of treatment, and were afterwards cured by the extraction of a decayed tooth. There is one circumstance in these cases which is very apt to mislead, and this is, that the pain is often not referred to the tooth; and relief, to a certain extent, is obtained by the use of narcotics and carbonate of iron. This, however, should not lead you to think that the disease has no connection with the state of the tooth and gum; and this fact is illustrative of a most important principle, viz., *that temporary relief by a purely anti-neuralgic treatment does not prove that no organic origin exists.* How often has hysteria depended on local disease, and the practitioner been misled by the temporary relief afforded by antispasmodics. I have seen the most melancholy examples of this, and have more than once been misled myself.

With respect to the remedies most generally employed in the treatment of hemicrania, they are chiefly preparations of arsenic, iron, sulphate of quinine, and opium. Of these, the recently precipitated carbonate of iron appears to be the best; indeed its success is frequently heroic. In proof of this you will find several very interesting cases detailed by Mr. Hutchinson in his excellent work. The best way of giving it is to combine it with an aromatic and a laxative; a small quantity of the pulv. cinnamomi comp., a few grains of rhubarb, and fifteen grains or a scruple of the carbonate of iron, will form a powder which may be given two or three times a day with advantage. It has been asserted, that the carbonate of iron is suited for fixed, and not for intermittent, cases of neuralgia; I have found the contrary to be the fact. I had lately a lady under

my care, who, in attempting to remove some furniture, received an injury by striking her cheek against a chest. She was treated for six weeks with purgatives, local bleeding, and mercury; the swelling, heat, and redness of the part went off, but the pain remained, being regularly intermittent, and occasionally very severe. This lady was perfectly cured by a tonic regimen, and the carbonate of iron, in scruple doses, three times a day. The sulphate of quinine has been proposed as being peculiarly adapted for intermittent cases; it will sometimes succeed, but I have known several cases where it completely failed. I grant that the character of intermission would naturally induce a practitioner to have recourse to it, but I have known so many instances of its failure, in purely intermittent neuralgia, that I give a decided preference to the carbonate of iron; I recollect the case of a gentleman who for six weeks had daily attacks of terrible hemicrania. When the attack came on he was obliged to remain perfectly motionless, the tears streaming from the eye of the affected side, the ear was exquisitely sensible to the slightest sounds, and he remained in a state of intolerable suffering for some hours. For the space of six weeks he took quinine *in enormous doses* without any improvement, and was ultimately obliged to give it up as useless. I have seen the same result in a great many cases, and as far as my experience goes, I would not place much reliance on quinine, even where the attack was of a purely intermittent character. I have seen some cases, indeed, where it has done good, and you may try it; but if, after three or four full doses, you find there is no improvement, you may be almost sure that it will prove useless. When it succeeds, one of the first effects produced by it is to put back the paroxysm for an hour or two, just as occurs when it is successfully given in a case of ague. But I feel certain, that if it is likely to succeed, its beneficial effects will be seen in the course of a few days, and to persist for weeks in using it is not only unnecessary but improper. In the very remarkable case to which I have just alluded, the gentleman, after having tried quinine without the slightest improvement for six weeks, was suddenly and completely relieved by a full dose of opium. At night, on retiring to rest, he took a strong opiate, awoke in the morning refreshed and free from pain, and has continued from that time to the present (a period of ten years) without any symptoms of hemicrania. Dr. Mackintosh says that the sedative solution of opium, or the acetate of morphia, are the best remedies for this disease he is acquainted with, and that he has seen many cases where they succeeded, after everything else had failed. You may also employ in such cases the external use of narcotics with great advantage, of which one of the best is the extract of belladonna. If you prescribe a liniment composed of a drachm of the extract of belladonna, with an ounce of the compound camphor liniment, you will have a powerful remedy, and one which, when applied to the surface of the affected parts, will often produce a great relief. I have sometimes used the acetate of morphia in the endermic mode, by putting

on a small blister, and leaving it on until vesication was produced, when the raised cuticle was cut away with a pair of fine scissors, and the surface dressed with an ointment composed of a drachm of lard, and from a grain to a grain and a half of the acetate of morphia. I remember two cases of intermittent hemicrania which yielded to this treatment. You will also frequently derive benefit from the internal use of stramonium and belladonna. There are many other remedies used for this purpose, but I shall not detain you any longer on this part of the subject; it will be sufficient to remark that the carbonate of iron, sulphate of quinine, and opium, externally and internally, are the remedies on which the most reliance is to be placed.

We have now to consider one of the most painful affections to which man is subject. This affection has been generally considered under two points of view, either as functional or organic. The functional, as far as we can judge of it, appears to be a pure neurosis; in the organic it is supposed that the disease is connected with an organic affection of some part of the brain; of these the first kind is that most commonly met with in practice.

Tic douloureux is one of the most melancholy and harassing affections to which the human frame is liable; in some instances the poor sufferer, after having lived for years in a state of exquisite misery, is at last worn out by the intensity and persistence of his agonies. Such was the fate of the late celebrated but unfortunate Dr. Pemberton. A great deal of light has been thrown on the nature of this affection by the researches of Sir Charles Bell. He seems to have succeeded in establishing several points connected with the nature and seat of this affection, one of the most important of which is, that the seat of this disease is in the sentient branches of the fifth pair of nerves, and not, as it has been supposed, in the portio dura. He has shown pretty clearly that the portio dura is the nerve which regulates the muscular motions of the face, producing all those modifications of features which we call expression, and also peculiar motions or changes connected with certain states of respiration; in a word, that it is the expressive and respiratory nerve of the face. It is, according to him, never the seat of tic douloureux, and the practice of dividing it for this complaint is as unscientific as unsuccessful. The division of the portio dura in such cases, not only fails to give relief, but also entails disgrace on the practitioner, and disfigurement and misery on the patient. *Its effect is paralysis of the muscles of one side of the face, and great distortion*, without the slightest relief. Yet it is a melancholy fact that such operations have been performed. Sir C. Bell's researches, however, have put an end to this malpractice, for he has shown that the fifth nerve is that which supplies the face with sensation, and that it is in its branches the disease is situated. We are then, I think, to look upon this disease as a neurosis situated in the expansions of the facial branches of the fifth pair of nerves. Sir C. Bell relates a very remarkable case, in which the patient had suffered

from a series of dreadful attacks, the pain coming on in violent paroxysms. From the accounts given by this patient, and from personal observation, he says that one could trace with anatomical precision the course and direction of the branches of the fifth nerve, for, on the recurrence of an attack of pain, he applied his fingers to his face, and made pressure on the foramina, where the different branches of the fifth nerve issue. Having done this, he would press the nerves with all his force, and remain in a fixed posture while the paroxysm continued.

Sir Charles Bell's idea with respect to the cause of this disease, is, that it generally depends on some visceral irritation reflected through the sentient branches of the fifth pair of nerves.

I have told you that this disease is one of the most melancholy affections to which man is subject, it is also one of the most obstinate. A vast number of remedies have been employed or proposed for its treatment, and this affords an illustration of the fact, that the more incurable a disease is, the more extensive is the list of its remedies. A few only are deserving of attention, and these I have already mentioned when speaking of hemicrania, namely, the preparations of arsenic, iron and quinine, and opium. Where these fail after a full trial, Dr. Bright looks upon the case as hopeless. Narcotics in every form and of every description have been employed, both externally and internally, but to all these the same remark applies; many of these remedies will give temporary relief, and the physician will flatter himself on the prospect of a favourable termination, but in a short time he is annoyed at finding that the disease has returned and left the patient as bad as ever. Many a time have I seen a poor sufferer excited by hope on receiving temporary alleviation from the use of arsenic or iron, and sinking into despair when he found that his torturing malady returned, and that the remedies which on the first trial gave relief on the second proved useless. The general principles which should guide you in your treatment are, first, to investigate carefully whether any visceral irritation exists, and remove it as far as possible, taking care at the same time to improve the general state of the patient's health; and the next thing is to allay the sensibility of the nerves of the part, and avoid all exciting causes. In certain cases this disease appears to be connected with an affection of the brain, and this seems to be an explanation of the fact before mentioned, that, in some cases, where all specific treatment had completely failed, relief had been obtained by shaving the head and applying ice to the scalp during the paroxysms. I have already mentioned to you a case in which this mode of treatment proved eminently successful. This is a curious fact, and one which, being of practical importance, you should hold in memory.

We have a form of disease consisting of violent paroxysms of pain, apparently nervous, and in which no doubt the branches of the fifth pair of nerves are engaged; it is generally found to depend on a local cause, being connected with some disease of the bones of

the face or skull, and bears a close analogy to tic douloureux. I have now witnessed several instances of this disease; in some cases it is produced by a carious tooth, in others by disease of the maxillary bones, and I have observed it to occur in one case of abscess of the antrum. The same thing has been observed by Dr. Bright, who gives a case in which the extraction of one of the bicuspids was followed by a gush of matter from the antrum and complete relief of the violent pain. I have also seen cases in which this affection appeared to be the result of disease of the lining membrane of the frontal sinus; of this also Dr. Bright gives an example. The case I witnessed was that of a lady who got a dreadful attack, resembling hemicrania, in consequence of being exposed to cold shortly after leaving a warm climate. She suffered the most violent agonies for some time, until one day she had a discharge of purulent matter from the nostrils, which was almost immediately followed by relief. This has recurred at intervals since that period, the pain ceasing when the discharge comes on, and returning when the discharge goes away. The pain is most intense, and situated in the direction of the frontal sinus, and running down along the side of the face; it is constant, and without any intermissions, returns upon the occurrence of any cause which checks the discharge, and is sometimes so excessive as to render her quite frantic. Whenever an attack comes on she applies a number of leeches over the frontal sinus, then warm fomentations, and this has the effect of bringing on the discharge and giving relief. In a conversation which I had with Mr. Crampton on this case, he stated to me that he had met with two similar ones, and that he had succeeded in accomplishing a perfect cure by inserting a large caustic issue over the top of the head. I accordingly advised my patient to have the same thing done. She has since that time left the country; but previous to her departure I certainly observed an improvement in her symptoms, and the principle of treatment appears to be perfectly rational.

This leads us to consider some affections of the sentient and motor branches of the fifth pair of nerves, in which the disease is connected with an affection of the brain. A very interesting and important case bearing on this point is given by Sir Charles Bell, which I shall briefly relate. The patient, a lady, had remarked, that for twelve months before the case began to assume a serious character, she felt an unusual sensation in the tip of the tongue, towards the left side, as if it had been burned. This sensation gradually extended over the whole of the left half of the tongue, the left half of the palate, gums, and face, accompanied by an almost total loss of proper sensation in the parts affected. The sensation of heat and uneasiness was increased by the least motion of the face, the application of her hand, and other trifling causes. This case was communicated to Sir Charles Bell by Dr. Whiting, under whose care it was. She had paralysis of the buccinator of the affected side, and the morsels of food had to be removed on that

side with the finger, so that she was obliged to perform mastication with the opposite jaw alone. The motions of the face, however, were properly performed, showing that the functions of the superficial branches of the portio dura were unimpaired, and the temporal and masseter muscles continued in their natural state. Her general health also was pretty good, and she complained of nothing but the affection of the side of the face, tongue, and palate, and the impossibility of masticating her food with comfort on the left side, in consequence of the state of the buccinator. Some time afterwards, while engaged in eating, she found that a new train of symptoms were in progress; her face became distorted by the retraction of the mouth to one side, the masseter and temporal muscles of the left side ceased to act, the tongue became protruded, with its tip directed to the left side, hearing ceased on the same side, she had some difficulty in performing the motions of the eye, and the eyeball began to waste and diminish. About a month before her death she became quite stupid, and spoke very indistinctly. She died after the disease had continued for two years.

Here was a case, presenting in the first instance symptoms of a nervous affection of the left side of the face, tongue, and palate, unaccompanied at that time by any paralysis of the muscles of the face. About a year afterwards, however, she began to exhibit symptoms of paralysis of that side affecting those muscles which are supplied by the branches of the portio dura and fifth nerve. Expression was now lost, the temporal and masseter muscles ceased to act, the mouth was drawn to one side, and the tongue protruded. In addition to this the sense of hearing on one side was lost, and the globe of the eye began to waste. On dissection, it was found that a tumour, appearing to be a morbid growth from the left crus cerebri, about the size of a pigeon's-egg, and containing some fluid, was situated over the left temporal bone. This production was partly cellular and partly membranous. But the most interesting part of the case was the examination of the state of the nerves. The first and second nerves were undisturbed, and so was the fourth. The third was slightly displaced; but it was on the fifth that the principal impression seemed to have been made, for it was flattened, thin, and wasted, as if from the direct pressure of the tumour. The sixth nerve was uninjured. The seventh was involved and lost in the tumour, from within a quarter of an inch of its origin as far as the meatus auditorius internus. Here is a drawing of the case; here is the fifth nerve flattened and wasted, and here is the seventh involved in the tumour.

Mr. Stanley gives a case very similar to the foregoing, of which I shall give you an abstract. The patient had hemiplegia of the left side, without loss of sensation in the affected arm or leg, but in the left side of the face there was a complete loss of sensation and motion. The loss of sensation and motion in this case would argue that there was an injury of the seventh nerve as well as the fifth.

The mucous membrane of the left nostril was red, and there was opacity and disorganization of the cornea of the left eye, with total loss of hearing on the same side. The patient died some time after the paralytic symptoms were established. On dissection, a tumour was found lying close to the *tuber annulare*, and compressing the fifth and seventh nerves.

Here was a case in which there was hemiplegia of one side, and complete loss of motion and sensation in the corresponding half of the face, with an erysipelatous redness of the nostril, inflammation of the conjunctiva, and disorganization of the cornea. It is a curious fact, that in cases where the sentient branches of the fifth nerve, which are distributed to the face, become affected, the eye is frequently disorganized. The cause of this appears to be that the eye, under such circumstances, loses the sensibility of its external surface, which is suplied by the branches of the fifth pair, and is consequently left in a state in which it can no longer protect itself from external injuries. In a case of this description which came under the notice of Mr. Crampton, the finger could be rubbed over the eyeball without giving the patient any pain, and there was chronic inflammation of the conjunctiva.

The principles which should guide us in the treatment of neuralgic affections of other parts of the body are the same as those which have been laid down in speaking of the neuralgic affections of the face. You will often meet with affections of this nature in females: they are situated generally in the right or left side, and are frequently, I regret to say, mistaken for cases of local inflammation. I have already dwelt on the disastrous consequences of mistaking a neuralgia of the liver for hepatitis, and showed the mischievous consequences of treating it with purgatives, leeching, blistering, and mercury. There is an analogous affection of the left side, which has frequently been mistaken for disease of the heart, and treated accordingly. It is most commonly observed in females of a nervous habit. To this affection the same principles will apply as to hepatic neuralgia; by regulating the patient's general health, prescribing a mild nutritious diet, giving up all antiphlogistic measures, and the judicious employment of tonics and narcotics, you will be able to effect a cure.

It has been lately proposed to use the nitrate of silver in the treatment of cases of this description, from its success in epilepsy. A very interesting memoir on this subject has been recently transmitted to me from Paris by Dr. Lombard, in which he dwells on the utility of the nitrate of silver in several nervous affections. Some persons, but in particular the disciples of the physiological school, think that nitrate of silver relieves cerebro-spinal irritation by creating a new irritation elsewhere; that its efficacy consists in its causing a revulsion of the gastro-intestinal mucous membrane; and that thus we cure an epilepsy by substituting a gastritis. In proof of this they bring forward cases where a chronic gastritis was found to supervene on the removal of an epilepsy by this

remedy. This, however, is by no means a fair or logical deduction. The epilepsy might have been preceded and produced by the chronic gastritis, though the symptoms of the latter were not recognised, owing to the existence of other symptoms of a more prominent and striking character. The gastritis might have had a priority of existence, and might have been the cause of the epilepsy; the epilepsy might be cured, and the patient die afterwards with symptoms of chronic gastritis. This shows you how cautious you should be in receiving, on medical subjects, the *post hoc ergo propter hoc* argument. This mode of explanation of the cure of one irritation by the substitution of another, sprung from the denial of all specificism, in disease and its remedies, by the school of Broussais, one of the greatest errors of the "*physiological doctrine*." The use of mercury in syphilis, of bark in ague, and many other instances, have been quoted against it. If in these diseases there be nothing but local irritation, why does not ordinary antiphlogistic treatment always suffice for their removal? Why is it that mercury is the best revulsive in syphilis? The specific character appears under this view, as well as under any other. The term specific may be objectionable as not being precise, but we use it for want of a better, and it rather expresses what the disease is not than what it is.

There is another and a more rational objection to the employment of nitrate of silver; namely, that it has produced a blackening or discoloration of the skin. This, in my opinion, is an objection which will always weigh against the use of the remedy, for there are few who would like to encounter the risk and consequent blame of such an event. It has not been proved that nitrate of silver has cured epilepsy by superinducing gastritis, but it has been proved that it may blacken the skin. Dr. Lombard admits that this may and does occur, but he thinks the frequency of its occurrence much overrated, and states that in the majority of his cases it did not happen at all. He mentions a very interesting fact connected with this subject. It has been supposed that exposure of the skin to the influence of sunlight during the use of the nitrate of silver is the cause of the blackening. Now Dr. Lombard says that this cannot be the case, for one-half of his patients were peasants who worked in the open air, and never took the slightest precaution against exposure to the sun's rays; and yet, among them all, there was no instance of discoloration. He is of opinion, therefore, that the influence of the sun's rays should not be taken into account in a case of blackening of the skin; and this appears to be confirmed by the fact, that in all cases where the nitrate of silver produced discoloration, the patients were inhabitants of towns, and consequently less liable to exposure. This blackening of the skin, though a rare circumstance, will, as long as we are ignorant of the causes which produce it, and the means of controlling them, be a great obstacle to the internal use of nitrate of silver. I have used this remedy in cases of epilepsy and other diseases, and cannot say much for it; in

the hands of some of my friends, however, it has been much more successful. Dr. Lombard thinks very highly of its value. In some cases in which he prescribed it a perfect cure followed, in others more or less relief. He give some cases of facial neuralgia, in which it appears to have produced a cure. He has also prescribed it with success in epilepsy and chorea.

There is one fact, which appears to show that the cause of the blackening of the skin is connected with something else besides the influence of the solar rays, which I had almost forgotten. In a late number of the *Quarterly Journal of the Medical Sciences*, Mr. Brande gives an account of some experiments he made on the bodies of persons who were tinged by the nitrate of silver. He found on examination *that the deep-seated parts were tinged as well as the superficial*, and was able to detect the oxide of silver in the bones, and even in the substance of the viscera, as well as in the skin. If this be the case, we cannot attribute the discoloration to the solar rays, though it generally happens that the face appears to be darker than other parts of the body in persons who have undergone this change of colour. The fact, however, that in Dr. Lombard's cases the peasant escaped while the citizen became tinged, and Mr. Brande's discovery that the deep-seated parts are equally liable to discoloration, furnish a weighty objection to the opinion that the blackening of the cuticle is produced by the decomposing power of the sun's rays.

LECTURE XCIV.

DR. BELL.

NEURALGIA—Appropriateness of the term—This disease may be caused by inflammation of the nervous sheath—Origin of neuralgia sometimes in the nervous centres—Change in the state of the nerves themselves and in their extremities—*Diagnosis* of neuralgia—Nerves and regions chiefly affected with neuralgia—the fifth pair and the dorsal and sacral nerves—Varieties of neuralgia specified—Dorso-intercostal neuralgia mistaken for irritation of the spinal cord—Its seat, symptoms, and diagnosis—Lumbar neuralgia—Crural neuralgia—Femoro-popliteal neuralgia, or sciatica—Membranous, ganglionic, and visceral neuralgia—*Treatment* of neuralgia.

NEURALGIA is a term of modern origin, for which we are indebted to Chaussier; and a better one could not be framed, since it simply expresses a fact (pain of, or in, a nerve), the chief feature in the case, without its being connected with or derived from any hypothesis. The occasional changes by injection, thickening, and effusions of the neurilema of a nerve affected with neuralgia, show that the disease may be of an inflammatory nature; but in many, and perhaps a majority of cases, there is no structural lesion evident. The chief seats of neuralgia are in the first and second branches of the fifth, in the sensitive portions of the dorsal nerves, and of the

par vagum, and in the sciatic nerve. A distinction has been drawn between neuralgia of the nerves of animal and that of the nerves of organic life, in the paroxysmal returns of the former coming on in the latter part of the day or in the evening, and those of the latter early in the morning. But an exception to this rule is presented in the history of twenty-two cases of frontal neuralgia reported by Dr. Rennes, in which the attacks for the most part were in the morning, and in sixteen of dorsal neuralgia by Dr. Valleix, which came on in the day as well as the night.

In attempting to ascertain the seat of neuralgia we are not to regard the part pained as that in which the primary nervous lesion exists. This latter may be at the sentient and percipient centre, in the medulla oblongata and brain, as in the instance of pain still referred to a limb which had been long before removed by amputation, or strongly felt in a particular nerve during a dream, or induced during the waking state by strong mental emotion. All the causes which influence powerfully the nervous centres, such as great atmospherical mutations, moral affections, intellectual labour, prolonged watching, a habit of body peculiarly sensitive and nervous, may give rise to neuralgia. Bearing this fact in mind we are the less surprised at the occurrence of intense pain along the course of a nerve whose structure is perfect, whilst, at other times, a manifest and great laceration of a nerve is productive of slight and scarcely painful sensation. Connected with this general condition of the nervous system, not measured by anatomical change or lesion, is the greater predisposition to neuralgia at particular periods of life more than others; the two extremes of life, infancy and old age, being in a measure exempt. Although the general proposition be admitted, that neuralgia may depend on certain unappreciable modifications of the nervous centres, — we must not stop here in our inquiries, but proceed to note the vital and organic changes in the nerves themselves. Organic and hygienic causes may act directly on a nervous cord, increase its sensitive property, or continuedly work on its sensibility, and give rise to neuralgia. We generally find that the superficial or subcutaneous nerves are most subject to this disease. Persons who by their calling are habitually exposed to the effects of cold and humidity, such as fishermen, sailors, inhabitants of marshy countries, the workers in certain manufactories, are very liable to neuralgia: — half, that is fashionably, dressed females often suffer in the same way from the same cause. Physical and mechanical causes, by which nerves are compressed, stretched, or pricked; organic changes by tubercles or neuromæ developed in their tissue, inflammations of the neurilema or in the substance of a nerve, making part of or situated in the neighbourhood of an inflamed organ, may also all, severally, give rise to neuralgia. Of this last nature are the facial neuralgiæ which so often accompany extensive inflammation of the pituitary membrane, and the sympathetic pains resulting from a phlegmasia of the kidneys, uterus, and testicle.

The extremities of nerves may be so impressed as to give rise to neuralgia — continued pressure of a boot or shoe, which is too short, on the end of the great toe, will cause this disease. Of a similar nature is the neuralgia depending on a carious tooth and inflamed gum; although this is a case which ought, perhaps, to be regarded as neurotis, or inflammation of a nerve, rather than neuralgia. There are other cases in which inflammation of the gum, as well as organic changes of the tooth, had long ceased, and yet the pain still continues, and constitute often one of the most troublesome facial neuralgias, or tic douloureux. Even here the influence of the nervous centre is every now and then powerfully and instantaneously manifested, as when the protracted and racking pain of toothache disappears with the arrival, or announcement of the arrival, of a dentist, who comes to extract the decayed tooth.

The *diagnosis* of neuralgia, although laid down by some writers with great precision, is not quite so easy as would appear from their showing. Periodicity or paroxysmal recurrence at irregular intervals, relief by pressure and friction, absence of heat, redness, and tumefaction, and occasionally even a sensation of coldness in the part affected, are the common symptoms of neuralgia, whether this disease attacks the organs of animal or of organic life. Thus, one almost instinctively presses the abdomen in neuralgia of the stomach and intestines, or in *gastralgia* and *enteralgia* — whereas, if neurotis, or other phlegmasia be present, the least degree of pressure cannot be borne. The same difference is often observable in facial neuralgia. But, on the other hand, we see at times cases in which the slightest touch, or even the jar communicated by shaking the bed or sofa on which the patient lies, gives the most violent pain. Writers are not careful enough to separate neurotis from neuralgia, nor in fact is it easy to do so, combined as these two states are in certain cases of recognised neuralgia. Thus, Dr. Elliotson says neuralgia is very inflammatory, so that the surface is tender, hot, swollen, and even red. If the absence of pain on pressure were to be received as diagnostic of neuralgia, we should have to exclude from this class that large variety depending on or connected with spinal irritation, in which augmented sensibility of the parts supplied by the affected nerve is one of the most constant symptoms.

Mention has been made already of the nerves chiefly affected with neuralgia. I will just add a rapid sketch of the chief varieties of the disease, in reference to the regions affected and the organs which are the greatest sufferers. The nervous centres themselves, at least the sentient part of them, may be the seat of neuralgia, the pains of which are felt at the surface and envelopes of the brain and spinal marrow, rather than in the substance of the organs themselves. In this respect there is an analogy to what takes place in the neuralgia of a nervous cord, the symptoms of which are felt at the extremity or expansion of the nerve on the surface of the organ. Cephalalgia, therefore, which we use instead of *cerebralgia*, may, like neuralgia of the cords and their extremities of the nerves, be

dependent on or associated either with simple irritation or phlogosis — an important consideration which it behoves us to bear in mind in practice. In *delirium tremens* and certain other varieties of cerebral disease, there is more *cerebralgia* than cerebritis, and we ought not to be misled by pain, and exaltation and disturbance of function under such circumstances, so far as to take them for unequivocal symptoms of inflammation. Opium and narcotics, if our diagnosis be a correct one, would take precedence over, and be substituted for the lancet, leeches, and purging. I might, did space permit, illustrate this proposition by describing the phenomena of *myelalgia*, and show that these were manifested at a distance from the medulla spinalis, sometimes by exquisite tenderness of the skin of one or more limbs, and of the muscles of particular regions, sometimes by subsequent irregularity of movement consequent on morbid sensation, as in certain changes of the voice, spasms of the esophagus, convulsive cough, dyspnœa, vomiting, colics, and cramps. Most of the neuralgic affections, however, which have been attributed to a morbid state of a part of the spinal cord, proceed, as I shall have occasion soon to show, from the spinal nerves, and particularly the intercostal. In all these affections of the cord or its nerves, the neuralgia so far predominates over neurotis, that we shall often find counter-irritation and anodynes suffice for entire relief without having had recourse to sanguineous depletion.

The *neuralgiæ of the encephalo-spinal nerves* are mainly the *facial*, *intercostal*, *lumbar*, and *sacral*. The first or facial includes a great variety of pains in different parts of the face, in the course of the branches and sometimes twigs of the trigeminal or fifth pair. I shall notice the chief of these, but must premise that, more frequently, the pain is met with in the three branches of the nerve on one side, than in any one or two of its branches. Pain on pressure corresponds, in the majority of cases, with the pain complained of by the patient in the course of the nerve — 1, the *frontal* or *supra-orbitar*, the pains of which, beginning at the supra-orbitar foramen, extend to the upper eyelid and eyebrow, and the corresponding side of the forehead and face, following all the nervous ramifications and anastomoses of the orbito-frontal nerve. Sometimes the pain is fixed on the nasal arch and frontal sinus, or on the ramifications of the nerve over the globe of the eye, constituting in the first place a *coryza*, and in the second *ophthalmodynia*, or an eye painful, watery, and intolerant of light, with commonly some tenderness of the conjunctiva. Frontal neuralgia is usually intermittent, and sometimes merely remittent, — the paroxysm coming on daily in the evening, lasting a part of the night, and disappearing towards morning and during the day. At other times, and particularly where the neuralgia is either associated with disease of the chylopoietic viscera, or is brought on by the common causes of intermittent fevers, the paroxysm is in the morning. Dr. Rennes (*Eclectic Journal of Medicine*, 1836–'7, from the *Archives Générales*, June, 1836,) describes thirty-two cases of the disease

depending on atmospherical vicissitudes, and occurring in a rural district, and at the same time with influenza, which were of this nature.

2. *Sub-orbitar Neuralgia.* — This kind is described by writers under the names of *prosapalgia* and *odontalgia*. As its title indicates, it affects the sub-orbitar branch or superior maxillary of the fifth or trifacial nerve. The pain radiating from the sub-orbitar foramen, is sometimes continued in the line of the muscular branches of the face, sometimes in that of the deeper seated or dental branch, and extends, in the first instance, to the lower eyelid, the internal angle of the eye, the cheek, the *ala nasi;* and, in the second, to the maxillary sinus, the palate, uvula, base of the tongue, and often to the whole side of the face, following the anastomoses of the fifth with the ramifications of the portio dura of the same side. In this case the pain is apt to be accompanied by convulsive twitchings of the lower eyelid, cheeks, and upper lip: — the arteries of the affected side beat with more force, but not, as has been commonly asserted, with more frequency: the veins are more dilated, and sometimes we see all the symptoms of a true fluxion, such as redness of the eyes and face, tumefaction of the eyelids, and an abundant excretion of tears and nasal mucus.

This variety of neuralgia exhibits the intermittent type; sometimes it is remittent; but in either case its paroxysmal returns are in the evening. At times the neuralgia is confined to a single twig of the superior maxillary branch, and hence the names given to each of these sub-varieties of *sub-orbito-nasal*, *labial*, *palpebral*, and *dental*.

3. *Maxillary Neuralgia.* — In this variety the pain follows the course of the inferior maxillary branch of the trifacial or fifth nerve, and consequently extends not only from the superior mental foramen to the alveoli, lower teeth, sides of the tongue, and to the chin, but also may be irradiated over the cheeks, temples, and the external and anterior portion of the ear, by following the anastomoses of the nerve with the ramifications of the portio dura in this region. The right side is somewhat more frequently affected than the left. This neuralgia is less evidently periodical than those already described, but like them may be sometimes accompanied by partial convulsions and deformity of the mouth and eyelids. Facial neuralgia, complicated with muscular contractions, though less painful, is generally more obstinate than simple neuralgia. To these sudden and jerking movements, as it were, of the muscles, the term *tic* has been applied, and the sensations accompanying it caused it to be qualified with the epithet *douloureux*, or painful. These twitchings are met with in a small proportion of facial neuralgiæ. When the neuralgia affects chiefly the alveoli and roots of the teeth, it simulates closely toothache — the more readily, because a carious tooth will give rise to both diseases, which may also, notwithstanding the persistence of the cause, be periodical, and yield to remedies directed against periodicity.

Facial neuralgia rarely makes its attack suddenly; it is often intermittent, and I have seen it alternate occasionally with lumbar neuralgia. Commonly it is most apt to occur when the weather is cool and damp, but I know of two cases in which the worst paroxysms used to come on in the hottest days of summer.

4. *Neuralgia of the Cord of the Tympanum.* — This variety, described by Itard under the name of *otalgia*, more particularly attacks children and sometimes adults, in connexion with facial neuralgia. The intermission of pain, its darting and divergent character, the absence of fever and other symptoms of phlogosis, distinguish it from internal *otitis*. The introduction of a little soothing balsam, or even sweet oil and two or three drops of laudanum, or an injection of warm water, will often suffice for its cure.

5. *Cervical Neuralgia.*— This is of rare occurrence. Sometimes it has been caused by bleeding the jugular vein, and by the bites of leeches to the neck.

6. *Thoracic and Intercostal Neuralgia.* — Under this head are properly included those neuralgic pains affecting the mammæ, shoulders, thorax, and the hypochondriac and epigastric regions, and which are connected with, or, as it has of late years been generally thought, originate from spinal irritation itself, manifested by tenderness of one or more vertebræ on pressure. Omitting, as either generally known or not germain to our present purpose, a notice of the essays which have appeared within the last fifteen years, on both sides of the Atlantic, on the subject of spinal irritation, neuralgia, functional affections of the spinal cord, &c., I am fortunately able to indicate, with more precision than has hitherto been attempted, the seat and character of the kind of neuralgia now under consideration, by borrowing from the very clear and detailed essay by Dr. Valleix, in the *Archives Générales de Médicine* for January, February, and March, 1840, the facts in which he has subsequently extended and published in a volume entitled *Traité des Nevralgies, où Affections Douloureuses des Nerfs*, 1841.

The title of the chief variety of the disease examined by Dr. Valleix is *dorsal* or *intercostal*, and in his book called *dorso-intercostal neuralgia*. When pointing out the fact of the roots of the dorsal nerves being much higher than the point of their exit from the vertebral canal, he takes occasion, from this anatomical fact, to expose the inaccuracy of the English writers, who attribute the disease in question to irritation or any other lesion of the spinal cord. The pain caused by pressure on the spine, according to their own description, exists always at the posterior end of the intercostal space, in which last is found the painful point in front. It is then at the very exit of the nerve, and in a line with the intervertebral foramen, that we discover the pain. Were the irritation really of the spine, we ought to detect the pain at the origin of the nerve, and consequently at the spot higher up than the foramen. Each dorsal nerve at its departure from the intervertebral foramen is divided into two branches; one, *posterior*, goes directly back-

wards, and gives off filaments variously distributed, some of which, and they the ones most interesting in the present question, pass between the transverse processes and the muscles which cover them, and are distributed to the skin of the back. The *anterior* branch is, properly speaking, the continuation of the nerve. That of the first dorsal nerve comes out below the first rib, and that of the twelfth below the last or twelfth rib. It is important for us to know that this branch is not subdivided in any notable manner until towards the middle of the intercostal space: at first it is situated beneath the intercostal muscles, and is only covered internally by the pleura; then it is engaged in the muscles, and passes between them until it has reached the middle of the intercostal space, where it divides in the manner just indicated. The ramifications are not distributed in a uniform fashion. Thus, in the first three dorsal nerves there is an intercostal branch which continues in the original direction, or rather towards the inferior part of the intercostal space, and another branch which goes to the shoulder. The eight following dorsal nerves furnish, also, an intercostal branch, which is continued in the original course, and only penetrates the muscles which cover it at a short distance from the sternum, or from the outer border of the external part of the great abdominal oblique muscle, whence it distributes its filaments to the integuments of the anterior part of the chest and superior of the abdomen. In place of a brachial branch, such as was given out by the first three nerves, these eight furnish, each of them, an *external* pectoral branch which penetrates the external intercostal muscle, and distributes filaments to the integuments. The last or twelfth dorsal nerve is appropriated to the muscles and integuments of the abdomen, and is divided into a superficial and a deep-seated abdominal branch; a division this analogous to that of the preceding nerves.

In summing up these anatomical details, the application of which will soon be obvious, we find that the dorsal nerves have three principal divisions, — the first immediately after their exit from the intervertebral foramen, — the second about the middle of the intercostal space, measuring from the spine to the sternum; — and the third a little external to the sternum or to the upper part of the rectus muscle. Thus at each of the points of division there is a branch which is superficial and gives twigs to the integuments. There are three of these perforating branches, — one *anterior*, near the sternum; a second, or *middle*, the name of which indicates its situation; and a third, or *posterior*.

Under anatomical guidance we can now speak more understandingly of the seat of dorso-intercostal neuralgia. As to the side which is chiefly affected we find notable differences. In twenty-five cases noted by M. Valleix, the neuralgia was on the left side in seventeen; the right in seven; and in both sides in one. M. Nicod, the only writer who has examined this subject in a methodical manner before M. Valleix, makes the proportion in which the two sides

were affected as 15 of the left to 1 of the right. M. Bassereau designates the proportions as follows, in thirty-seven cases: on the left side, twelve; on the right side, six; and in both sides, nineteen. It requires after all a good stock of *numerals* to enable us to reach a positive conclusion.

The number of the intercostal spaces occupied by the neuralgia varies from 2 to 8. This last number was only met with in two cases. Frequently (six times) there were but two of the spaces affected; and if we were to take a mean term expressive of the whole, it would be three and a fraction. But even when a considerable number of intercostal spaces was the seat of neuralgia, more commonly two or three of them, and generally the sixth and seventh, were much more sensitive than the others, and appeared to be the centre of the pain. To extend the proposition a little more, we might say, as the result of a table given by M. Valleix, that dorsal neuralgia would seem to display itself in preference, on the fifth, sixth, seventh, eighth, and ninth intercostal spaces, and that, in an especial manner, it is met with most frequently from the sixth to the ninth — a result very nearly the same with that announced by M. Nicod. M. Bassereau makes the fourth, fifth, and sixth, the preferred spots.

The spaces which were the seat of pain were in no instance affected through their whole extent, at least during the entire course of the disease. In speaking of neuralgic pains, we ought, however, to state separately, the pain caused by pressure, that caused by various movements, and that felt spontaneously in certain dragging, pricking, and darting sensations. The latter sometimes extended over the whole space. Three principal parts were the seat of pain on pressure, — the vertebral or posterior point was always sensitive, viz., in 25 cases; the anterior point in 19 of these; the middle or lateral in 17. The posterior or vertebral point is on one of the sides of the spinal column, between two vertebræ, and precisely at the spot corresponding with the intervertebral foramen. This painful spot was of circumscribed extent, varying from half an inch to an inch and a half. Hence it happens, that at a very short distance from a point at which pressure gave great pain, considerable force might be used without exciting any unpleasant sensation. This fact will be referred to when we speak of the diagnosis. The direction of the line of pain from the posterior point was always forwards, and neither backwards on the vertebræ, nor upwards or downwards on the spinous processes.

The *median* point at which pain on pressure was felt, is, as the latter indicates, the middle of the antero-posterior direction of the intercostal space, or rather in the prolongation of a vertical line drawn from the axilla to the crest of the ilium, for the first five or six intercostal spaces, and an inch or an inch and a half farther back for the lower ones. The median space was also circumscribed like the posterior was found to be; its limits being from half an inch to an inch and a half. In the cases in which the pain extended

more than half an inch it was in the longitudinal or antero-posterior line, and consequently in the course of the nerve, as in the case of the posterior point.

As to the *anterior point*, the pains were more variable and multiple even than the preceding ones. In the fourteen cases in which it was met with, pressure gave rise to it at a point not far from the sternum, and always between this point and the beginning of the cartilaginous portion of the ribs. But the extent of the space affected was hardly greater than that of the posterior and median spaces. A variety in the point affected in this last or anterior division is worthy of being recorded: it is in the *epigastric* location, or rather termination of the pain. Thus, when pressure on the spaces between the cartilages was productive of pain, if it was continued forwards under the angular curvature, and on the epigastrium for an equal breadth, the pain was equally felt. This line of direction of pressure of course passed over some of the cartilages of the ribs, and there was an interruption accordingly in the course of the pain between the inter-cartilaginous point and the epigastric point, for a space equal to the breadth of the cartilages. The limitation of the region of epigastric pain, and its line of direction from the anterior and inner point, externally and outwardly in the track of the intercostal nerve to the spine, will serve to distinguish this neuralgia from gastritis.

The painful spots above indicated are so not by pressure alone, but even in consequence of strong inspirations, cough, movements of the arms and sometimes of the trunk; and the darting pains themselves had commonly their point of departure from these spots, which we may regard as so many centres of pain from which it radiated in the course of the nerve.

An explanation of the occurrence of pain at these spots is furnished by the anatomical details already premised. Thus, backwards at the exit of the nerve from the intervertebral foramen a branch is detached which traverses the muscle, and is distributed to the skin; here is the first painful spot or point. Towards the middle of the intercostal space the nerve becomes also superficial, and detaches another branch which passes on to the teguments, giving a second spot for painful sensation. Finally, at the anterior spot, near the sternum and towards the epigastrium, the nerve again comes nearer to the surface than before, and distributes its filaments to the integuments of the anterior part of the thorax, making the third painful point. I have had cases under treatment in which the symptoms correspond precisely with those here detailed. The seventh, eighth, and ninth intercostal spaces were the ones affected, and the epigastric pain terminated exactly at the median line. The right was the side affected; pressure on the spine itself was not productive of pain. More than two years elapsed before recovery took place in one case. For the greater part of this period the patient, a female, was unable to walk without great difficulty, owing to loss of power of the lower limbs. Pain alternated between the

intercostal spaces and back of the sacro-iliac junction and hip of the right side.

A complaint of pain in any part of the chest, without cough, or even at the epigastrium, should induce the physician to run his finger down with a moderate pressure on each side of the spinal column, at the spino-costal junction and in the direction of the intervertebral foramina. If there be an intercostal neuralgia, the patient shrinks from pressure at the affected point, and cries out at the pain which he experiences. By continuing the pressure downwards, the physician arrives at a line beyond which no positive sensation is felt, and he thus has the limits, upper and lower, of the spine affected with neuralgia. By next passing his finger in a line from the posterior point of pain in the first intercostal space affected to the sternum, he learns the direction and limits anteriorly of the disease.

M. Valleix was not led to any positive inference respecting the causes, either predisposing or occasional, varying from the received opinions on the subject. It was found that the most frequent complaints of pain were in snowy weather, even by patients in their rooms; and returns of the disease most common in winter. The duration of the neuralgia was from one to six months; and where it assumed an intermittent character the disease recurred at intervals from one year to four years, whether remedial means were had recourse to, or whether at each return the pain was left to disappear of itself. Women are affected in much larger proportion than men. The association of dorso-intercostal neuralgia with uterine disease has been often noticed.

The differential *diagnosis* of intercostal neuralgia has been already stated incidentally. We distinguish the disease from affections of the respiratory organs by means of auscultation and percussion, and by taking cognizance of the seat, direction, and limits of the pain; and from rheumatism of the muscles of the thorax, by remembering that the pain in this latter is more diffused, less acute under pressure, and more so by motion. *Angina pectoris* has been thought to depend on intercostal neuralgia, but it is distinguishable from this latter, by its paroxysm, and the feeling of constriction and agonising distress which accompanies it. The diseases of the spinal cord cause sometimes a local pain, which is situated on the spinal processes and not on the sides. In caries of the vertebræ, pressure on the ribs, by these latter acting on the diseased bone, causes pain at the spine, which is not the case in neuralgia.

I resume the enumeration of the different varieties of neuralgia, by mentioning *lumbar neuralgia, lumbo-abdominal* of M. Valleix, which has been called by Chaussier and others, *ilio-scrotal and spermatic*, and, by some, lumbago. It may occupy one or several of the different lumbar branches, and be felt, according to the extent of these nerves, in the loins, at the crest of the ilium, and over the great trochanter, or along the spermatic cord, in the scrotum, vulva, bladder, urethra, &c., giving rise to

a crowd of symptoms calculated to render the diagnosis obscure. I have had under care a young person with this kind of neuralgia, in whom the symptoms of disease of the bladder were such as to induce fears of gravel associated with those of *prolapsus uteri* — all of which disappeared by the removal of the lumbar neuralgia. In another case there were so many of the symptoms of *prolapsus uteri* present, that I deemed it my duty to recommend an examination *per vaginam*. Somewhat to my surprise the uterus was high up, perfectly *in situ*, but the *os tincæ* painful to the touch. A persistence, however, in the remedies which had been already prescribed for the lumbar neuralgia, which also was present in this case, was followed by entire relief of all pain and abnormal sensation whatever. The patient has since then become pregnant, for the first time, after a marriage of some years' duration.

It will be sufficient to mention some other varieties of neuralgia, without making any additional remarks on them. These are the *scapular* or *deltoidean;* the *cubito-digital*, which extends from the olecranon to the index and middle fingers; the *femoro-pretibial* or *anterior crural*. The *femoro-popliteal*, or sciatic neuralgia, demands more attention by its frequency of occurrence, its obstinacy, and the agonising pain with which it is every now and then accompanied. Under the name of sciatica it is usually spoken of as one of the varieties of rheumatism. General experience does not correspond with the opinion advanced by M. Jolly, (from whose article *Nevralgia*, in the *Dictionnaire de Méd. et de Chirurgie Pratiques*, I have taken so largely,) that sciatica is more common in women than in men, owing to the causes of pregnancy and labour of child-birth operating on the former. The nerve is, no doubt, in different states in different persons, and at different times in the same person — its neurilema being sometimes inflamed and thickened, and sometimes containing gelatinous effusions, by all which the nerve proper must suffer. At other times again, this latter is intact in its structure, and the affection is then one of simple neuralgia. In the first case, cups or leeches on the hips and behind the great trochanter, or on the outer side of the thigh, with other parts of an antiphlogistic treatment, will benefit, if not cure. In the second, the customary modifiers of sensibility, especially narcotics and tonics, must be the chief curative agents.

The principal seats of pain in femoro-popliteal neuralgia are, according to M. Valleix (*Traité, &c.*), 1, in the haunch and hip; 2, the thigh; 3, the knee, to the head of the fibula; 4, the leg; 5, the foot. Pain in the lumbar region is not unusual, it being in the proportion of cases as of ten to thirty-six; and on both sides in eight out of the ten. Pain was uniformly complained of at the posterior and superior spine of the ileum, in a line from the upper portion of the coccyx to near the border of the sacrum. Out of thirty-six cases, the knee was the seat of pain in seventeen. In fifteen cases of the thirty-six, pain was felt in the calf of the leg at the part where the gastrocnemii and soleus are separated by a fibrous sheath. The

foot was painful in twenty-four out of thirty-six cases. Motion of any kind, as by turning in bed, coughing or laughing, exasperates the pain of sciatica. Darting or shooting pains were felt in nearly all the cases. In some, pains were experienced in other parts, such as the head, chest, loins, and abdomen, but especially the head and chest. Semi-paralysis and shrinking or atrophy of the limb, are unusual occurrences in sciatic neuralgia. The function of respiration, digestion, and circulation, are not affected with any uniformity. Obstinate coldness and damp skin of the extremities, both upper and lower, I have seen in this disease. The sensible states of the atmosphere make little difference in the frequency of pain. Periodicity, but without uniformity, is met with. As regards sex, the proportion of males affected out of the entire number counted (124), was three-fifths.

Plantar neuralgia is occasionally met with, and is not a little annoying to the patient, who complains of a pain in the sole of his foot to which the plantar portion of the popliteal nerve is distributed.

Neuralgia of the nervous extremities where they are lost in, or blended with the tissues, are common enough, as in neuralgia of the muscular tissue, which is not at all connected with inflammation, but is met with in the onset of certain typhoid fevers, acute gastro-enteritis, and in the chill of an intermittent fever, or from suppressed perspiration, atmospherical changes, &c., and which are commonly designated as rheumatic: akin to this variety is that attacking the fibrous and osseous tissues, and which are attributed, and, in fact, are occasionally caused by syphilis, mercury in excess, scurvy, &c.

Neuralgia of the serous tissues shows itself sometimes in violent pain of an intermittent character, attacking the meninges of the brain, the pleura, and the peritoneum, but which yield readily to sulphate of quinia and opium.

Neuralgia of the mucous tissues comes, for the most part, within the list of ganglionic neuralgia; but we have examples of it on surfaces which belong to the cerebro-spinal system, as in the pituitary membrane, the conjunctiva, the bronchia, and the large intestine, &c. The skin is occasionally the seat of violent pain without inflammation, just as the parenchymatous tissues are.

Although their course and extent be indicated with less precision than already specified, the neuralgiæ of the organs supplied by the sympathetic nerve or ganglionic system, cannot well be doubted. Bichat had early, in this path of inquiry, expressed an opinion that there are colics essentially nervous, independently of any local affection of the serous, mucous, and muscular coats of the intestines. These colics have obviously, he continues, their seat in the nerves of the semilunar ganglion which are distributed along the whole course of the abdominal arteries; they are true neuralgiæ of the nervous system of organic life, although they have nothing (little) in common with tic douloureux, sciatica, &c. Ganglionic neural-

giæ, like those of the other order, are intermittent, but less distinctly so than these. They are accompanied often with a great fluxion and discharge of fluids, as of urine, bronchial mucus in asthma, hooping-cough, and suffocative catarrh; hence also, probably, the deluge of fluid in cholera morbus, dysentery, &c.

In the nervous system of a mixed nature, that which connects the two lives, organic and animal, although it belongs more particularly to the latter, and which is sometimes called the *nervous apparatus of association*, we meet with marked examples of neuralgic diseases. *Pneumogastric neuralgia* may result from direct irritation of the nerve itself, as in the phlegmasiæ of the pulmonary and gastric mucous membranes: it is manifested by a convulsive cough, spasms of the air-passages, and of the diaphragm and stomach. Or it may be the effect of a sympathetic irritation transmitted from some remote organ by the medium of the ganglionic plexus, as in inflammation of the kidneys, testicle, and uterus, or even simple pregnancy, which will give rise to dyspnœa, or to obstinate vomiting, with acute and tearing pains of the epigastrium. Finally, pneumogastric neuralgia may, like all the neuralgiæ, depend on some lesion of the nervous centres. Of this nature are intermittent asthma, periodical coughs, nervous dyspnœa, and vomiting. *Gastralgia* is a variety of this kind of neuralgia, and either appears alone or is recurrent, and constitutes the chief symptom of some pernicious intermittent fevers.

Diaphragmatic Neuralgia is manifested by pains, more or less acute, with a constriction at the epigastrium and back, accompanied with hiccup, eructations, and vomiting. This may readily be confounded with rheumatism and inflammation of the diaphragm, of which I shall speak in a subsequent part of this volume.

I have not much to say on the *treatment* of neuralgia in addition to the judicious remarks of Dr. Stokes. This should be based on a knowledge of all the circumstances, physical, hygienic, and physiological, which have any influence in the production of the disease; and should include, of course, a just appreciation of its seat and its idiopathic or symptomatic nature. I have dwelt the more on the various seats of neuralgia, and the symptoms by which its varieties are recognised, because, in so doing, I believed that I was conveying most valuable instruction to the younger portion of my medical brethren, by teaching them to shun the common, I might say, barbarous empiricism which confounds pain and derangement of function with inflammation, and prompts to bloodletting, purging, and the heroical generally in place of the narcotic and soothing treatment.

Every resident in marshy and low situations is aware of the commonness of intermittent pains, hemicrania, frontal and facial neuralgia, ophthalmia, sciatica, &c., which sometimes accompany intermittent fever, and sometimes succeed to or are substitutes for it. The successful employment of the bark in former times and quinia now, is also pretty well known to the practitioner in such cases.

I have found, on occasions, the local detraction of blood by means of a few cups or leeches beneficial under these circumstances, both by the relief which they gave, and the speedier and more complete effect subsequently of sulphate of quinia. Arsenic has, I know, been administered often in these intermittent as well as some of the more untractable remittent fevers of neuralgiæ. Without intending to prohibit its use, I still think that a physician who administers it to his patient ought to give approved security that he will not injure the stomach of the latter, by bringing on chronic gastritis and its accompaniments.

In cases of feeble action of the organs generally, or of a sensation of coldness at the part affected, stimulants are indicated, and of these ammonia, camphor, and guaiacum are entitled to confidence: — The ammoniated tincture of guaiacum is a favourite prescription with some, — exhibited in such quantities as to keep the patient comfortably warm. With this view, a dose of half a drachm, or even four times the quantity, has been given and repeated three times daily, and sometimes every two hours. Where there is debility, with paleness, iron is, in Dr. Elliotson's opinion, preferable to quinia. Mercury carried to ptyalism has cured: but unless the subject have some strength, and a certain degree of excitement, he will only be more depressed and positively injured by such a course. Of the narcotics, the extract of stramonium, which we can so readily procure fresh in the United States, is entitled to fuller and more frequent trials than it receives; externally, also, in the form of tincture, or ointment spread as a plaster, it will be a good topical application to the affected part. When given, the stramonium should be continued in such a dose and at such intervals until its peculiar and marked effects on the brain and nervous system are produced. The most opposite means have been used with occasional success, as in one instance steam, in another ice. Dr. La Roche, of this city, succeeded in allaying and completely removing the pain of acute and protracted sciatica, which had resisted various remedies directed with no common skill and experience, by the application of ice over the affected part. The patient went to sleep shortly after it was put on. I have procured for my patient similar relief in facial neuralgia by this means. Ether used with the same intention is inferior to ice. Oil of turpentine in divided doses, so that a drachm or two be used daily, has been found to be very successful in a number of cases of sciatica, and in some other varieties of neuralgia by M. Martinet; and the same medicine in a full dose of half an ounce to an ounce by enema has been used with advantage. M. Valleix estimates the number of cases of sciatica cured by this remedy to be thirty-five out of fifty-seven, or the proportion of five-eighths.

Veratria and its salts and aconitine are certainly entitled to consideration, notwithstanding the unmeasured praise lavished on them by Dr. Turnbull; for assuredly the practice has been retarded by the indiscreet zeal of its advocate. In one case of tic douloureux in a lady,

in which I had employed sulphate of quinia, and iron and opium, after purgatives and alteratives, with only partial relief, an ointment, composed of twenty grains of veratria and an ounce of lard, was directed to be rubbed on the affected cheek, and in a short time with a most satisfactory result. The common proportion is ten to twenty grains to the ounce of lard or cerate. The cure was complete; and there has been no relapse up to the present time, which is upwards of three years from the date of the treatment. The sensation of heat and tingling was experienced by my patient shortly after rubbing in the ointment. Dr. Turnbull gives these symptoms as an evidence of the desired operation of the veratria, and indeed of its genuineness. Sometimes it gives speedy relief after its first application, but a renewal of subsequent trials, even though the tingling be felt, fails to benefit at all. A neater preparation is the alcoholic tincture, which is to be applied to the skin over the affected part. Of the internal use of veratria and its salts, and of delphinia and aconitine, which have been also recommended in neuralgic and rheumatic affections, I am not prepared to speak from personal experience. The dose of veratria, or of tartrate of veratria, the salt preferred by Dr. Turnbull, is a sixth of a grain in pill with half a grain of extract of hyosciamus, and some convenient vehicle, such as liquorice powder, — repeated three times a day. For the last two ingredients rhubarb should be substituted, when there is costiveness. The dose may be gradually increased to a grain and a half or two grains in the course of the day. (See Dr. Turnbull's Essay on the *Medical Properties of the Natural Order Ranunculaceæ.*)

That variety of neuralgia which is most common, and, in reference to its extensive symptoms, the most important in the eyes of a practitioner, is the dorso-intercostal. Under the name of spinal irritation it has been commonly, and I cannot but think successfully, treated by counter-irritation, by means of a small blister over the most painful spot and kept discharging, or by tartar emetic ointment or croton oil, and tonics, notably quinia, preceded by and alternating with laxatives. In many instances, the first step has been to detract some blood by means of cups or leeches applied near the affected part. Of the advantages of this latter prescription I can speak with much confidence, based upon repeated experience. I must add, however, that although the relief was in most cases in which I directed it immediate, yet this remedy was far from removing the disease, and I am not sure that it materially abbreviated its duration. Dr. Valleix found small blisters applied in the course of the affected nerve, and renewed at short distances, or on the painful points, to be the most successful remedy. Muriate of morphia applied endermically only served in his experience to allay temporarily the pain. He did not find cupping or leeches to cure the neuralgia; but, on the contrary, they seemed to aggravate it. Narcotics, quinia and iron, were not, in his observation, productive of any notable result.

I would refer you to a paper on Tic Douloureux, drawn up in

detail and with great fulness by Dr. Chapman, in vol. xiv. of the *American Journal of Medical Science*. In the same volume there is an account, by Dr. Thomas Harris, of several cases of facial neuralgia, some cured, others greatly mitigated by galvanism, applied through the apparatus directed by Mansford, the mode of using which will be described in the next lecture.

LECTURE XCV.

DR. BELL.

EPILEPSY—The true basis for treatment of this disease—Different causes and conditions require different treatment—Divisions of epilepsy—Women more subject to it than men—Hereditary predisposition; sometimes dependent on cerebral conformation—Epilepsy may exist with great mental endowments—Occasional exciting causes.—*Symptoms*—No uniform structural lesions.—*Treatment;* ought to be rational not empirical—Remedies for the plethoric state; the anæmic—Paramount importance of hygienic means of treatment, especially as regards food and exercise of mind and body—Bathing and frictions—The chief indications, to abate morbid susceptibility and to withhold all irritants to the nervous system—Vegetable diet preferable—Intoxicating drinks and tobacco to be abstained from—Probable morbid irritants—Chief remedies relied on in epilepsy—chalybeates; nitrate of silver; sulphate and oxide of zinc; sulphate of copper; oil of turpentine; digitalis—Galvanism.

IN the few remarks which I shall make on epilepsy I do not propose more than merely to fix your attention on the prominent traits of the disease and the philosophy of its treatment. I know that it may seem to argue no small presumption to speak of giving a philosophical character to the treatment of a disease which is for the most part deemed to be incurable. But let me at once explain my meaning in order to avoid imputation and criticism, which I hope not to merit. Epilepsy, although a cerebral disease, inasmuch as its distinctive phenomena consist in disorder of the cerebral functions, is, often, only so in a secondary manner, by the brain's becoming the recipient of irritative impressions from other and remote organs. The orgasm into which the brain is thrown, by its distended congested vessels, is rather an effect than a cause of the epileptic paroxysm. The brain is forced by some other organ into that state of excitement which ends in violent muscular movements or convulsions and the abolition of intellect. Ignorant as we so generally are of any fixed organic cause, certainly of any structural lesion in the brain productive of epilepsy, we must inquire into all the preceding and concomitant circumstances by which the disease is brought on, and, having done so, adapt our remedies and general treatment to the various and varying exigencies of the case. At one time the complaints of the patient are referrible entirely to the brain, at another to the heart; sometimes to the digestive system; and again to some part of the spinal cord and its nerves, or of the periphery, on the skin. In some cases the patient is plethoric, in others he is thin and emaciated. Some

manifest in the intervals between the paroxysms extreme mobility, — a sensibility open to all impressions, — an irritability which borders continually on passion. Others are sad, melancholy, and torpid — hard to be roused, and sinking immediately after being excited into their former apathy. With these differences in the accompanying features, and functional disorders of other organs besides the brain, in epilepsy, would it accord with the common principles of reason, and the more direct rules of therapeutics, to pretend to seek for a specific, a unit remedy, against all these multifarious and variable disorders, merely because the brain is affected. As well might we ask for a single or specific remedy, and complain that it is not found, against all convulsions, in all ages and under most opposite states of the body and lesions of particular organs — merely because the brain is necessarily implicated in causing the convulsions.

Epilepsy if not strictly a hereditary disease is readily developed in those persons one or other of whose parents was either epileptic or had suffered from cerebral disease in some form, or had been distinguished for some eccentricity or startling peculiarity of mental feature. In this point of view the treatment of such persons from early infancy ought to be carefully attended to, both in a hygienic and moral view, if indeed hygiene can ever be regarded apart from morals, or that there can be acceptable morality to the Creator when health is made to suffer. No specific either of amulet or physic can afford protection. Epilepsy is brought on by causes which either unduly excite or greatly enfeeble the nervous system and brain generally, — such as the large use of alcoholic drinks, insolation, violent passions, intense exertion of the intellect, and plethora, on the one hand, — or fear, venereal indulgences in extreme, masturbation, close and impure air, want of sleep, and general feebleness on the other. Can we expect any one remedy to countervail the deleterious operation of all these various causes? Epilepsy, most common in tender age, disappears often when the period of puberty is reached. Surely we cannot suppose any specific cause, certainly any fixed organic lesion in the brain or elsewhere, which had originally predisposed to this disease. The tendency to epilepsy, or the precursory state of the functions antecedently to a paroxysm of the disease, is manifested in disordered health in various ways. An amelioration of this and a consequent prevention of the disease is not, however, to be procured by any one medicine or specific. The occasionally distinct periodical character of epilepsy, and the length of the period, sometimes a year, between the paroxysms, seem to preclude the idea, in such cases at least, of a fixed organic cause, either in the brain or in any part of the nervous system, or in the blood, by deterioration of this fluid. In fine, whether we regard the predisposition, hereditary or acquired, to epilepsy, the causes inducing and the phenomena which accompany it, or the absence of any characteristic or even fixed lesion in the brain or other organ of those who have died of the

disease, we cannot persuade ourselves of anything peculiar in its pathology beyond a predisposition in the brain to be impressed by various agents, some external to the organs, some in their internal changes. In the abating of this predisposition and withholding or removing as much as possible the exciting causes will consist the treatment of epilepsy. For this treatment to be successful it must not be specific; but rather adapted to the varying constitutions, habits, and functional disorders of the patient, and it must be both hygienic and medical and continued for a length of time. One of the physiognomical characteristics of epilepsy, constituting in fact a predisposition itself, is a strumous habit. Now, every one the least conversant with pathology, knows that in order to produce a change in a habit of this kind, and thus to ward off the diseases incidental to it, whether they be scrofula, tubercle, or certain forms of dropsy, as well as epilepsy, we must, if not reconstitute the tissues, at least procure and maintain a sustained healthy digestion and hematosis until the work of absorption and nutritive secretion has been carried on so long as to have replaced the old by new materials — both of interstitial deposit and of rhythmic excitement to the organs, as by new blood and lymph. But this requires time, perseverance, and methodical hygiene, all of which elements and means must be enlisted in our favour, and in aid of, it might be medical heresy to say, in place of, agents strictly medical. Of little avail, then, will it be for any of you, who may hereafter be called upon for the purpose, to prescribe for a case of epilepsy, unless you make up your mind to carry out these conditions faithfully and patiently as far as you are concerned, and obtain the consent of the patients and friends to aid you, and to do themselves justice in the case as far as they are concerned.

Epilepsy has been divided by M. Esquirol, who has made the disease a subject of special study and investigation, especially in connection with insanity, into two species, the idiopathic and the symptomatic, and several varieties, viz., 1, that in which the seat or point of departure of irritation is in the digestive apparatus; 2, the angiotenic or bloodvessel system; 3, the system of white vessels; 4, the reproductive apparatus; 5, the periphery of the body. All these various causes are more or less active according to the predisposition of the individual.

Women are more subject to epilepsy than men. As respects age, the tendency to epilepsy is greatest in early life. Of sixty-six cases of epileptic women noted by MM. Bouchet and Cazauviehl, the larger number were affected with this disease between birth and the fifth year. Thirty-eight of these were victims to the disease before menstruation, and twenty-eight afterwards. The hereditary character of the disease is generally admitted. The writers just named tell us that in 110 patients respecting whom they had made the inquiry, 31 were hereditary cases; and Esquirol found that in 321 cases of epileptic insanity, 105 were descended from either epileptic or insane parents. A very limited acquaintance with the

disease must soon convince one of the truth of this feature in its history. A particular conformation of brain indicated by a flatness and squareness, or such as generally accompanies idiocy, is indicative also of epileptic predisposition. In such cases it is not uncommon to see the complication of these two forms of disease. But we are not to suppose epilepsy the product or associate always of imperfectly developed brains and feeble intellects, when history points out its having attacked Julius Cæsar, Mohammed, Petrarch, Rousseau, and Napoleon. Knowing, however, that all inordinate affections of the mind may induce a seizure in persons predisposed to the disease, we cannot wonder that they should have been sufferers in this way. Esquirol states that fits of passion, distress of mind, and venereal excesses, hold the next rank to terror, sudden alarm, &c., in exciting the disease. According to Licher, cited by Dr. Copland (*Med. Dict.*), out of 80 cases 60 were occasioned by frights of various kinds and degrees; but of 69 cases MM. Bouchet and Cazauviehl found only 21 that could be referred to this cause.

With a cerebral predisposition various and unlooked for changes in the general health, or local irritation, will bring on an attack of epilepsy. A man who had received a blow on his head was seized with epilepsy after the wound healed; and he only procured exemption from the attacks by its being again opened. A young man, twenty-eight years of age, experienced epileptic attacks whenever the weather was stormy. In his case atmospheric electricity acted on a carious tooth, the extraction of which was followed by a cessation of the epilepsy. A person who had contracted a syphilitic disease, and who had a bubo in the groin, was seized with epilepsy when he was cured of the bubo.

The *symptoms* of epilepsy, on which I shall not, however, enlarge, have been divided into those — 1, before the coming on of the paroxysm; 2, during the paroxysm; 3, immediately after this occurrence; 4, in the interval between the paroxysms. Sometimes there are no premonitory symptoms, and then the paroxysm comes on suddenly and with fearful violence. When they are present they vary both in number and intensity. Commonly some complaint is made of vertigo and headache, and the eyes and face are more or less injected and suffused. Various abnormal sensations are complained of in some part of the head or one of the limbs. The passage of this pain or anomalous sensation from the part where it is first felt, as at the end of a finger or in the foot, is toward the brain: when it reaches this organ the fit comes on; the patient falls down insensible, and is seized with violent convulsions, foaming at the mouth, deeply injected and almost livid face, starting eyes, &c. I have known this sensation, called *aura epileptica*, when it reached the heart, to cause violent palpitations, and sometimes to cease here; but, more commonly, it would pass thence to the brain and be followed by the epileptic convulsions. Occasionally it will start from the face, in the cheeks or temples, and be accompanied by severe twitches and a feeling of dragging or darting of the muscles of the part before the brain

is affected. Not unfrequently it is in the power of the patient when he first feels the *aura* in a limb to arrest its upward course by quickly passing a ligature or a handkerchief drawn tightly round the limb between the *aura* and the brain.

Various are the degrees of sensibility, cutaneous and other kinds, manifested by epileptics, or by the same person in different stages of the disease. Sometimes there is insensibility to common excitants, and even sinapisms and vesicatories produce little effect in this respect; and at other times the sensibility of the skin is extreme. Spinal irritation will show itself in the progress of the disease, but not in any uniform relation to it.

The *organic* or *textural* lesions in persons dead of epilepsy are in large proportion found in the brain, its meninges, or the cranium; and especially are the cerebral vessels congested if death had taken place during the fit. But, on the other hand, there are cases in which no change either in the structure of the brain or of any other organ can be found adequate to cause the disease.

Unfavourable as the *prognosis* in epilepsy generally is, we ought not to be discouraged from carrying out a properly designed treatment which we know will on occasions reward our exertions. Even when complicated with disease of the heart, most probably obliteration of the mitral valves and deficient power in the ventricle, I have found epilepsy to be amenable to remedies, and the sufferer restored to usefulness and ability to fulfil the active duties of life; the exemption at any rate for a whole year replacing paroxysms of every few days' recurrence.

Notwithstanding the occasional cures performed by an empirical treatment, the rational ought to have the preference. Hence, instead of forthwith beginning to dose an epileptic patient with sulphate of zinc, nitrate of silver, oil of turpentine or indigo, the remedies which just now rank highest in medical opinion, it is more fit, reasoning from the principles of medicine and our knowledge of the variety of phases in which epilepsy manifest itself, to adapt the treatment, both hygienical and medical, to the different exigences growing out of peculiarities of temperament and constitution, prior habits, and present exposures, and also complication of some other disease with the assumed one, or morbid susceptibility of the brain. Little good can we promise ourselves from any remedy or course of treatment so long as the exciting causes are in action, whether these be the depressing or the more exciting and perturbating passions, excessive or even common venereal indulgences, whether they be allowed by the marriage tie, or are unlawfully procured by promiscuous intercourse, or worse than all, by self-pollution or masturbation. Even the at other times laudable exercise of intellect on some favourite subject, and especially intense mental occupation, either in the pursuit of science or of ambition, must be refrained from. If woman be the subject, we must have ascertained the state both of her moral as well as physical being, before we can prescribe with a prospect of success, that is after knowledge of cause.

If the patient be plethoric, the suitable means of reduction will be directed: but we must distinguish well between real and simulated fulness of the bloodvessel system, and also between the temporary congestion of the cerebral vessels which follows high nervous excitement and subsides with the disappearance of the latter, and the real excess of blood sent to the brain as well as to all the other organs. It is not often that large, certainly not repeated, bloodlettings are required in epilepsy. More is gained by equalising the circulation, by the occasional detraction of blood topically, followed by revulsives, than by venesection. The class of revulsives on the present occasion should consist of purgatives, from which the patient will often declare himself to be much relieved; irritants to the skin of the extremities, or, if there be a local pain or morbid sensibility in some part of the spine or intercostal spaces, or at some spot near the heart, a blister to one or other of these parts. Fixed cerebral disorder, manifested by alternate vertigo and faintness, drowsiness, unequal frame of mind, deviation from the natural feelings, ought to prompt to the keeping up a discharge from the nucha by a series of blisters or by a seton; or that which I prefer, a succession of small blisters along one or other side of the spine. This last practice is useful also when there is a weakness and an evident diminution of locomotive power on one side, manifested by, among other symptoms, a slight halt in the gait, and a less ready grasp of an object with the weakened hand.

If anæmia and a soft and flabby state of the voluntary muscles, and a correspondingly soft and flaccid state of the heart, as indicated by auscultation and the pulse, exist, we must not think of detracting blood, but rather have recourse at once to tonics; sulphate of quinia where the paroxysms assume anything like a periodical character as they sometimes do, and in other cases chalybeates combined with aloes, or an equivalent purgative to keep up a soluble state of the bowels.

But our success eventually in the cure of epilepsy will be found to turn on the adoption of and perseverance in hygienic means of treatment — so adapted to the constitution of the patient and circumstances of the case as to act on the several organs in a manner corresponding with the effect produced by medicinal agents. More especially are the functions of the stomach, brain, and locomotive apparatus to be regulated by the soundest discretion. Thus, the food must be of such a nature as to furnish adequate nourishment without irritating the stomach or bowels, and be calculated at the same time to obviate constipation. This last would cause a fulness of the cerebral vessels inviting the disease; whilst diarrhœa or occasional looseness, by interfering with regular digestion, contributes to a mobility of the nervous system by which it is more open to the operation of common exciting causes. Permanent and efficient derivation from the brain will be obtained by regulated and full bodily exercise, so as to divert a large amount of blood into the voluntary muscles and at the same time to determine to the skin and maintain a sensible perspiration. The tepid bath, and after a

while the cool bath, and assiduous friction, will contribute to the proposed design of derivation, and also to give that tone to the nervous system by which it is rendered less morbidly impressible to the common excitations either from without or those occurring in the discharge of the organic functions. Equable temperature of the skin and its uniformly agreeable sensation ought to be maintained by warmth of the feet and an avoidance of heavy hat or head-dress, or even of a thick head of hair, and ligature of any kind, as by stock, tight cravat or shirt collar, round the neck. Some recommend that the scalp should be shaved once a week and well rubbed daily with a flesh-brush, after the tepid shower bath or a simple process of pouring a flagon of cool water on the head inclined over a large basin. There is, however, after all, no means so efficient to remove the morbid excitability of the nervous system, which so continually invites to a paroxysm of epilepsy, as regular and full exercise. With this view the patient must put himself in a course of training, and persist in it for a long period, until he feels that his whole constitution is changed, and that he is proof against all the trials which before, at each moment, would make his heart palpitate with violence, his limbs tremble, and his senses confused in all their perceptions. But in order that the expected benefit may be derived from exercise, the extremes of undue repletion or of abstinence must be avoided. A full meal will oppress the brain, encourage drowsiness and disinclination to exercise, and fasting will prevent healthy sensibility, and break the rhythm of the functions of the nervous system. More especially prejudicial is a full meal or a repast of stimulating food at an advanced hour in the day or in the evening; while, on the other hand, the period of fasting should not be long between rising and breakfast. Suitable variety can be procured from day to day without much mixture of articles of food on the same day, or, above all, at the same meal. Never ought more than one kind of meat, plain roast or boiled, or, preferably to either, stewed, be eaten at a meal. In the selection of vegetables and the use of fruits a similar rule should be followed, so as to avoid primarily irritation of the stomach, or secondarily that of the intestines, and particularly of the lower, by a needless amount or imperfect change of the excrementitial portion to be exonerated. If the patient be young, or of a full and plethoric habit, it will be advisable to abstain entirely from animal food, or to use it in very restricted quantity. Drs. Fothergill, Heberden, and Abercrombie, recommend an exclusively vegetable diet; and the first and last lay great and deserved stress on entire abstinence from strong or intoxicating drinks. Little prospect of permanent recovery can be held out so long as they are used by the patient. Tobacco, as a perturbator of the nervous system, which suffers alike by the large use, and by occasional abstinence from this vile weed, ought to be thrown aside at the same time. In fine, if we would give the patient a fair chance of entire restoration, he ought to be exempt as much as possible from all these causes, which either weaken the nervous system, and thus augment unduly its susceptibility to impression of every kind, or which cause or increase plethora, and thus multiply

and give additional force to common and otherwise physiological stimulants. While we are engaged, on the one hand, in diminishing by a proper tonic course, consisting chiefly of hygienic means, the original undue susceptibility of the brain and nervous system generally, we must sedulously withhold every irritant which might task beyond its powers this system. A small piece of undigested meat, a nut or other fruit hard of digestion; worms; unduly retained or too abundant fecal matter; irritation of the bladder or of its neck; pressure by a slight node on a sentient nerve; any sudden impression on one of the senses, or strong emotion or intellectual strain; too much sleep, or sleeping with the head low, will severally suffice to bring on an epileptic attack in the person predisposed. To none of these modes of irritation, then, ought the patient if possible to be subjected.

A brief mention of some of the most prized medicines, chiefly of the class of tonics, which are employed in epilepsy, will conclude my remarks on the disease at this time. I have spoken of chalybeates, as applicable to a particular state of the system in epilepsy, characterized by anæmia and a soft and flabby state of the voluntary muscles with palpitation and feeble pulse. Not dissimilar to this state of things are the nervous epilepsy and the uterine epilepsy of authors, for the relief or cure of which the preparations of iron are among our best remedies. In strumous habits or decidedly scrofulous subjects the iodide of iron is serviceable.

Nitrate of silver has perhaps obtained more suffrages in its favour than any one medicine for the cure of epilepsy, especially among the English practitioners. The dose is a sixth of a grain gradually increased to three or four grains, three times a day. Dr. Powell in some cases has increased the dose to fifteen grains, in pills, but he rarely found stomachs that could bear more than five grains in solution. The usual mode of administering it in pills made of bread has been objected to, on account of the chloride of sodium which this contains: it is easy, therefore, to substitute some simple vegetable powder or mucilage. The great objection to the prolonged use of lunar caustic is the blue or bronzed colour of the skin to which it gives rise. Dr. Johnson asserts, however, that there is no instance on record where the complexion has been affected by the medicine when restricted to three months' duration. But even to this point it is not necessary, or at least advisable, to go; and hence we ought to discontinue it for a while, after a month or six weeks' use. Nitrate of silver is best adapted to the asthenic stage or form of the disease, and may be usefully combined with hyosciamus or with camphor.

Sulphate of zinc and *oxide of zinc* have always maintained a reputation in epilepsy. Dr Babington (*Guy's Hospital Reports*, No. xii.), in a paper on this disease, indicates his preference for the sulphate of zinc, which, if not quite so efficacious as the nitrate of silver, is free from the objections to which the latter is subject, viz., its strong action on the stomach and the discoloration of the skin.

This gentleman has given the sulphate in larger doses than are generally recommended. In some instances he has directed as much as thirty-six grains three times a day. He has found this quantity to be taken equally as well in solution as in pills, care being taken gradually to increase the dose.

Sulphate of copper has been recommended by not a few practitioners on the strength of the numerous cures alleged to have been performed by it. Dr. Hawkins prescribed it in a dose of a fourth of a grain combined with sulphate of quinia. The cuprum ammoniatum was by some believed to be still more efficacious, but more extended trials have not sanctioned the first impressions on this head.

Oil of turpentine should be regarded as one of our best, if not the best remedy, in epilepsy. I have not compared it with nitrate of silver; but have found it far preferable to any of the other metallic preparations and to indigo. I directed it often in large and purgative doses, or from ℥ss. to ℥i., usually conjoined with castor oil, in the same quantity; and in the intervals gave it in smaller, or drachm and half drachm, doses, with mucilage of gum arabic. When the patient is enfeebled, and the skin cold or torpid in its functions, I prescribed sulphate of quinia with the oil of turpentine, with good effect. In some nervous and irritable subjects, its action on the neck of the bladder is injurious by exciting the brain and endangering a return of the paroxysm.

Recently the praises of *digitalis* have been revived by Dr. Sharkey, whose essay (*An Inquiry into the Effects of Digitalis in the Treatment of Idiopathic Epilepsy*), is chiefly intended to set forth the efficacy of this medicine in the disease. Doctor Sharkey, as the title of his essay implies, believes digitalis to be adapted only to the idiopathic and uncomplicated forms of epilepsy. The best mode of exhibiting the medicine is in infusion with strong beer or porter, in the proportion of 3½ ounces of the recent leaves of digitalis, bruised, to a pint of the malt liquor. Macerate for seven hours, and then strain. Of this, four ounces are to be taken with ten grains of the dried leaves, or of the dried root, of the *Polypod. quercus.* The treatment of epilepsy with digitalis should begin immediately after rather than immediately preceding a fit.

Mr. Mansford attaches great value to galvanism in the treatment of epilepsy. The apparatus which he used is described by him as follows: —

It was said, that in order to fulfil the indication stated at the commencement of this section, it was desirable to establish a negative point as near the brain as possible, and a positive one in some distant part of the body. Accordingly, a portion of the cuticle of the size of a sixpence being removed by means of a small blister on the back of the neck, as close to the root of the hair as possible, and a similar portion in the hollow beneath, and on the inside of the knee, as the most convenient place: to the wound in the neck, a plate of silver, varying according to the age of the patient, from

the size of a sixpence to that of a half-crown, was applied — having affixed to its back part a handle or shank, and to its lower edge, and parallel with the shank, a small staple, to which the conducting wire was fastened. This wire descended the back till it reached a belt of chamois leather, buttoned round the waist — it then followed the course of the belt, to which it was attached, till it arrived opposite the groin on the side it was wished to be used; it then passed down the inside of the thigh, and was fastened to the zinc plate in the same manner as to the silver one. The apparatus so contrived was thus applied: — A small bit of sponge moistened in water, and corresponding in size to the aperture in the neck, was first placed directly upon it — over this a larger piece of sponge of the same size as the metallic plate, also wetted, was laid — and next to this the plate itself, which was secured in its situation by a strip of adhesive plaster passed through the shank on its back, another above, and another below it. If these be properly placed, and the wire which passes down the back be allowed sufficient room that it may not drag, the plate will not be moved from its position by any ordinary motion of the body. The zinc plate was fastened in the same manner — but in place of the second layer of sponge, a bit of muscle answering in size to the zinc plate was interposed: that is, a small bit of moistened sponge being first fitted to the aperture below the knee, the piece of muscle* also wetted then followed, and on this the plate of zinc. The apparatus thus arranged will continue in gentle and uninterrupted action from twelve to twenty-four hours, according to circumstances. This last is the longest period that it can be allowed to go unremoved: the sores require cleaning and dressing, and the surface of the zinc becomes covered with a thick oxide, which must be removed to restore its freedom of action; this may be done by scraping or polishing: but it will be better if removed twice a day, both for the greater security of a permanent action, and for the additional comfort of the patient.

The treatment during a paroxysm will be be very simple. The tight parts of the dress, if there be any such, should be loosened; the head a little raised; a piece of wood or wire introduced into the mouth and held between the teeth to prevent the tongue from being bitten. The face may be sprinkled with cold water.

For a plain sensible view of the treatment of epilepsy, I refer you to the article on the disease to Dr. Cheyne (*Cyclop. Pract. Med.*), and for copious details on all the points of pathology and treatment to Dr. Copland's Medical Dictionary.

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* A piece of soft buckskin is more cleanly than the muscle and equally as efficacious.

FEVERS.

LECTURE XCVI.

Fever—General considerations on—Erroneous modes of investigation—Importance of the labours of French pathologists—complication of fever with local disease—Primary and secondary fevers—Relation of, to local changes—tendency to spontaneous termination—Principles of treatment—Errors of Brown and Broussais—Researches of MM. Gaspard and Magendie—Their pathological conclusions—Importance of the knowledge of secondary lesions—Effect in preventing crisis—Treatment—Humoralism and solidism.

It may be safely asserted, that in the whole range of medical science, there is no subject on which so much has been written and so little known as fever. You will find, in the writings attributed to Hippocrates, a series of observations on the rise, progress, and termination of febrile affections, which it must be acknowledged are characterized by singular beauty and truth; and I think I may venture to say, that such is their extreme accuracy, such the comprehensiveness, acumen, and power of the master mind that made them, that scarcely a single one has been overturned by the researches of modern times. From the period of Hippocrates almost down to the present day, the contributions to this department of medicines, though numerous and varied, were of very inconsiderable importance; they effected little towards the improvement of our knowledge of fever, and many of them were calculated rather to puzzle and mislead, than to throw light upon what was difficult and obscure. In place of studying the phenomena and effects of fever, instead of applying themselves to what was tangible and useful, the minds of medical men were occupied in tedious but profitless attempts to discover the proximate cause of fever, and it was to this subject that the labours of some of the greatest men in medicine were exclusively directed for a series of years. The consequences of this was, that our knowledge made no real progress, and as little was known about fever in the time of Cullen and Brown as in that of Hippocrates. We had innumerable discussions as to its cause and nature, we had a vast quantity of learned writings and ingenious speculation, but they produced nothing available for practicable purposes, nothing tangible or real. The investigators failed, because they reversed the Baconian method of arriving at the truth; they first built up a theory, and then thought to make the phenomena of nature square with it; they forgot that, to be truly philosophical, we must first recollect, compare, and arrange facts; and, when we have done this, we may deduce from them a theory, cautiously, and with a strict regard to truth. They did not pursue this course, and the consequence is that they added nothing to the sum of our valuable knowledge. Their disciples

knew nothing more than was known to Hippocrates; in fact, they knew less, for their notions on the subject of fever had reached them through an erroneous and distorted medium. The followers of Cullen viewed it through the theories of Cullen, the Brownists through those of Brown; both alike forgot nature, and both were consequently inferior to Hippocrates in true knowledge. They attempted to discover the proximate cause of fever, and they failed, as men generally do, when they attempt to investigate first causes. We know very little, indeed nothing, of the nature of first causes; they are, and will in all probability remain for ever, beyond the range of human intellect. It may be argued, that Cullen and Brown did not seek to ascertain the first cause, but only the proximate cause of fever; but this is only a play upon words, both are shrouded in the same obscurity, and in both the same difficulty attends our investigations. Even suppose we say with Cullen, that fever is a spasm of the extreme vessels; or with Brown that it is asthenia of the whole system, what do we learn by this, or what use is our knowledge? Have we more defined and accurate notions of fever? — Certainly not. They failed, as all men do who occupy themselves in the fruitless labour of searching after first causes. There is but one First Cause, and even of Him we know nothing accurate, but what He has vouchsafed to reveal.

Modern pathologists have pursued a course very different from this, and the consequence has been that they have arrived at the most splendid results. Instead of attempting to investigate proximate causes, they have studied the *phenomena and effects of fever*, they have examined dead bodies, they have accurately appreciated the series of pathological changes they present, and endeavoured to connect those changes with the symptoms. In this great work the French pathologists took a prominent part; indeed, I think it may be asserted, without fear of contradiction, that a vast proportion of our improved knowledge on the subject of fever is due to the French. It has been, I regret to say, too much the fashion to decry the labours of the French pathologists; but I believe this has been chiefly done by persons who would gladly possess the knowledge they affect to despise. The French pathologists have pursued with respect to fever the same method they have so successfully employed in the investigation of other diseases; and though their researches have not thrown any important light on its proximate cause, they have taught us a vast deal as to its phenomena and complications, they have established a great number of valuable facts, and unfolded a series of beautiful truths; and, I need not say, that it is in the appreciation of these facts that a proper knowledge of fever consists.

In the first place, they have strongly drawn the attention of the medical world to this great truth, which should be engraven on your minds — *that mere fever, without local disease, is of very rare occurrence.* Here was a new and extraordinary light thrown upon the misty doctrines of the older pathologists. With them fever was

a nonentity, something they endeavoured to describe but could not, something apart from and totally unconnected with organic change. The result of this mode of viewing the question was a variety of crude hypotheses and fanciful speculations. Bear this always in mind — mere fever, unaccompanied by local disease, is very rarely met with. Recollect, too, that it has been established beyond the possibility of doubt, *that fever, complicated with local disease, is the rule, and its non-complication the exception.* We have further learned from modern pathology, *that every system and every organ in the body may be, and frequently is, diseased during the course of fever, and that, in the vast majority of cases, death is the result of one or many local inflammations.* We further learn, that the character and symptoms of fever are infinitely varied, and that the cause of this variation mainly depends on the seat, the number, and the nature of the local affections. It is to these that we are to attribute the principal modifications in the character and phenomena of fever, and it is by these that its course and termination are mainly influenced.

Dr. Fordyce, in his work on fever, attempts to give a definition of the disease, and as I feel convinced that it is, if not a definition, at least one of the best descriptions of fever, I shall give it as nearly as possible in his own words. The style of this description is quaint but expressive. "Fever," says he, "is a disease which affects the whole system; it affects the head, trunk, and extremities; it affects the circulation, absorption, and the nervous system; it affects the skin, fibres, muscles, and membranes; it affects the body, and it affects the mind; it is, therefore, a disease of the whole system in the fullest sense of the term. *It does not, however,*" says he, "*affect the various parts of the system uniformly and equally, but, on the contrary, sometimes one part is more affected than another.*" This last observation is totally at variance with the idea that fever is a mere morbid condition of the whole system without reference to local lesions, for he expressly states that it does not affect the whole system uniformly and equally. This excellent view of fever seems to be borne out completely by modern pathology, and particularly the last part, where he says, that in cases of fever one part is more affected than another. We have, for instance, cerebral fevers, nervous, bilious, gastric, and catarrhal fevers, by which, it is to be observed, we do not mean to imply that there is nothing more than simple disease of the brain, or nerves, or liver, or bowels, or respiratory system, but that in each of these fevers disease predominates in some particular part. So that when we speak of these fevers, we speak of such a disease as Fordyce has described, in which one part of the body is affected more than the rest. In many of the schools you will still meet with Cullen's division into synocha, synochus, and typhus, a division by which we gain nothing at all, these terms being but mere words and no more. Will any one define what is meant by synocha, or synochus? Will any one say what is typhus? Will any one say that a particular class and

character of symptoms and morbid changes apply to any of these affections? It would be quite impossible. What we generally find is, that in the different cases of what have been termed synocha, synochus, and typhus, though they may present the symptoms belonging to each separately, yet in these same cases, at some period or other, the symptoms pass into one another so as to confound the original distinction. We have synocha to-day, synochus to morrow, and then typhus: or we may have typhoid symptoms at first, and inflammatory ones afterwards, and so on. We find, too, *that similar causes will produce in different individuals essentially different forms of fever*, and hence it is that we cannot found any distinction of fevers on their exciting causes. Nothing is more common than to see in two patients the same lesion producing, in one the synocha, in the other the typhus of Cullen. Thus, whether we look to the progress, symptoms, or exciting causes of fever, we find that this division has no foundation in nature, and is purely scholastic.* Synocha, synochus, and typhus, are but mere names without meaning, terms which belong to the dogmatism of theory, and not to the expression of truth, and yet it is dreadful to think of the numerous lives which have been sacrificed at the shrine of this dogmatism.

Fevers may be divided into two classes. We have, in the first place, fevers which we may call primary or essential, in which we find (as far as human investigation can go) affection of the whole system, of the fluids as well as of the solids. This general state of the whole system seems in such fevers to have the initiative, constituting the first step in the process of disease; but it is also true, that in almost every instance of essential fever, local disease springs up at some period or other of its course. We have, then, in these fevers this primary state of the system, the cause and nature of which are unknown, and we have this followed by various secondary lesions, affecting different parts of the body, and presenting characters by which we can arrive at a knowledge of their nature, more or less.

In the second class of fevers, we place all those in which the first affection is local, and the fever secondary. Observe the distinction between this and the former class. In the first kind, or primary, the local disease is consequent on the fever; in the secondary, fever is the result of local disease. Let us take an example of each. A person in health is exposed to the contagion of typhus; he becomes languid and weak, has troubled sleep, bad digestion, and low spirits; after some time, what is called fever sets in, and during the course of this various local diseases may

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* [This important truth, so long familiar to the profession in the United States, through the writings and lectures of Dr. Benjamin Rush, is not yet fully admitted and appreciated by the European schools of medicine. — B.]

supervene. In the other case, a person, also in health, from exposure to cold, or from some local injury, gets an attack of inflammation of the lungs, or some other local lesion, and, as a consequence of that lesion, has symptomatic fever.

Now the relation which the fever bears to the local symptoms in each of these cases is different. In the first case, the fever is primary, and the local affections secondary; and it may happen that, although the local diseases may be modified or removed, the fever will still continue; but in the second, the fever always vanishes on the removal of the local disease. We have to enter on the consideration of the first of these to-day, and to examine that morbid state of the whole system in which local disease supervenes at some period of the fever; in other words, where the lesions of particular parts or organs are symptomatic of the fever.

I have already mentioned, that one of the great truths at which modern pathologists have arrived, is, that local disease commonly occurs during the course of fevers. It has also been established that, in the great majority of cases, the cause of death is one or more local inflammations. The experience of every candid pathologist is in favour of this doctrine. Patients seem to die of fever, but the fact is that some die by the brain, some by the lungs, others by the digestive system, that is to say, during the course of fever they get disease of various organs, some of the brain, some of the lung, and a vast number of the digestive system, often sufficient to destroy life if there was no fever at all. It is an undeniable fact, that, in the great majority of cases, there is local disease of some part or other of the body, and that a vast proportion of fever patients are carried off by local inflammation. How plain, then, is the deduction from these facts, that the man who neglects the viscera in fever is practising with his eyes shut.

So much for the first great fact of the complication of fever with local disease, and its important bearing on practical medicine. But there is another general consideration with respect to these primary fevers, they have a tendency to terminate spontaneously; of the cause of this spontaneous termination we are still in ignorance. One of the most simple and familiar examples of this is the paroxysm of an intermittent. A patient, who is at present apparently in good health, will in the space of an hour or less be attacked with severe rigors, followed by all the symptoms of fever, a flushed countenance, hot skin, quick pulse, and high coloured urine, and in some time afterwards a copious perspiration breaks out, which is attended with complete relief to the symptoms, and the patient gets well again. From this time until the period of the next attack he continues to all appearance in health. Now, if we consider each of these paroxysms as an attack of fever, we see in them an evident disposition to terminate spontaneously. The same thing occurs in the case of the exanthemata. Scarlatina, measles, and small-pox, have a regular course, which generally terminates at stated periods; they also exhibit a succession of

stages characterized by corresponding symptoms. We observe the same disposition to terminate spontaneously in most continued fevers, and it has been further remarked, that this spontaneous termination generally occurs on particular days. We have then two great leading facts in the history of all primary fevers, first, that they are most commonly complicated with local disease, and, in the next place, that they have a great tendency to terminate spontaneously and on particular days.

Now, gentlemen, you will please to observe, that a knowledge of these two very important facts furnishes us with two great indications — one, to discover and remove, or modify the local inflammations; the other, to support the patient's strength, so that he may not become exhausted during the progress of the disease, and thus lose his chance of this spontaneous favourable termination. These two indications, though apparently incompatible, are not so in reality. You will of course understand that the extent to which we pursue one or other of these indications, must necessarily vary according to circumstances. The rapidity, violence, and particular seat of the local inflammation, the duration of the attack, the age, sex, and constitution of the individual, all these are circumstances which must be taken into account in adopting any plan of treatment, whether calculated to remove local disease, or support the patient's strength.

The similarity between the different individual cases of fever, is too faintly shadowed out to amount to anything like identity; in fact, there are no two cases of fever perfectly alike. You might as well expect to find two human beings exactly alike as to find two cases of fever perfectly similar. The causes of this remarkable variation are reducible to the extent, variety, seat, and complication of local disease, and to the peculiarities of the patient's constitution. These two classes of circumstances produce infinite varieties in the appearance and character of fevers.

The followers of Brown saw nothing in fever but debility, and their practice was to support the strength, and give stimulants from the commencement, ignorant of the fact, that neglected local inflammation will produce and keep up debility. The followers of M. Broussais, on the other hand, think that fever is sympathetic, that it depends on local inflammation, and that it must be subdued by depletion. Truth lies between. We must do both, we must combat the local inflammations by antiphlogistic means, and we must support the patient's strength by a well regulated regimen. These two indications are by no means incompatible, but their application must vary according to circumstances. If it be true, then, that local disease is very common in fever, and a frequent cause of death, it is plain that to practise without a knowledge of the state of the viscera, would be acting like the physician mentioned by D'Alembert. He compares him to a blind man armed with a club, who comes to interfere between nature and disease. If he

strikes the disease, he kills the disease; if he strikes nature, he kills nature.

A discussion has arisen in modern times, as to whether we should look upon all fevers as sympathetic. This is one of the leading doctrines of the school of M. Broussais. He declares that all fevers are sympathetic, that there is no such thing as an essential fever, or, in other words, that there never exists that peculiar morbid state of the *whole system* to which we apply the term fever; that in all cases fever is the result of local lesions, and that on the removal of these lesions its cure will depend. To this conclusion the school of M. Broussais was compelled to come in consequence of their exclusive solidism. They endeavour to reduce all the phenomena of life, whether in a state of health or disease, to the mutual action and influence of the viscera and solid parts on each other. They are solidists, in the strict sense of the word, and can have no conception of fever as existing independently of some primary local lesion. But it seems that the leading points of this doctrine have not been able to stand the test of an impartial examination, and may at present be looked upon as disproved. You will see at once the importance of this, when you consider that if it be true that all fevers are sympathetic, the practice must necessarily consist in the discovery and removal of local lesions, and no more. But I said that these doctrines are now disproved, and the following arguments may be laid before you in proof of this statement.

In the first place, let us inquire whether any cause acting on the whole economy is capable of producing local disease. Mark, the object of our inquiry is to ascertain whether any cause operating on the whole economy is capable of producing local disease. Now, I believe it is quite certain that such is the fact, and that we may have, first, a morbid condition of the whole system, and, consequent on this, various local lesions. Several continental pathologists, but in particular MM. Gaspard and Magendie, have shown, by repeated experiments, that we can produce all the phenomena of typhus in the lower animals by introducing putrid substances into the system. These gentlemen injected putrid substances into the veins of animals, and applied them to the surfaces of wounds, and, in every case where these experiments were performed, they observed that the animals became ill, had languor, loss of appetite, thirst, prostration — in fact, all the symptoms of bad typhus; *and, in case of death, that they exhibited, on dissection, local lesions corresponding with those we meet with in the human subject in fever.* Now, observe, these animals were, previous to the experiment, in a state of perfect health; they are, then, subjected to the operation of a cause which is found to produce a morbid state of the whole system; they die, and on dissection inflammation and ulceration of the mucous membrane of the digestive tube, and other lesions, are discovered in almost every instance. It would be quite absurd to say here, that the ulceration of the bowels was the cause of the morbid symptoms, for the animals were previously healthy. We

can come to no conclusion, then, but that the introduction of putrid matter produced that morbid state of the whole system which is termed *fever*, and that the local inflammation was the result of this state. It is the same thing with respect to the exanthemata. A child is exposed to the contagion of small-pox; for some time nothing particular is observed; he then gets ill and feverish, and this is followed by an eruption of variolous pustules. Here we have a local disease consequent upon a circumstance affecting the whole system, and in this, as in the former examples, the local lesion is secondary. We might as well argue that the pustules were the cause of the symptoms in one case, as to say that the ulceration of the intestines was the cause of the other. Every one, I think, will admit that the pustular eruption in a case of small-pox is secondary, and not the cause of the symptoms; and the same argument will apply to the secondary affections of typhus. If it be true, as appears by M. Magendie's cases, that fever follows the introduction of putrid substances into the body, and that the morbid state of the system produces inflammation of the intestinal mucous membrane: if, too, we admit that in small-pox the pustules are secondary, and consequent on a morbid state of the whole system originating in contagion, the same argument will hold good in all cases of local inflammation, (whether of the liver, lungs, brain, or any other organ,) which may arise during the progress of fever. These facts are adduced in support of the first part of the argument — that local lesions may be and are consequent on that morbid state of the whole system to which the name of fever is applied.

The next thing to be observed with reference to this question is, that if it be true that typhus is merely symptomatic of local disease, it would then follow *that there should be as constant a relation between the symptoms during life and the morbid changes seen on dissection*, as there is between the fever of pneumonia and the changes presented by the lung. But this is not at all the case, for we find that there is no constancy, no uniformity, either in the seat or extent of the local disease. Two patients will exhibit symptoms of typhus not differing in any material point, and yet, on dissection, you will find little or no traces of disease in the intestinal canal of one; in the other, you will find in the same parts a vast amount of disease. Two others will also present symptoms very similar; in the one you will find the lung healthy and normal, in the other you will find it extensively disorganized. Would it not be absurd to assert here, that the fever was symptomatic of the local lesion, seeing that there is no constant relation between the symptoms and the morbid changes, either as to situation or extent? Again; it is a fact, that you may have several patients presenting different symptoms, and yet, when you come to examine their bodies, you find the same morbid changes in all. One may exhibit all the phenomena of typhus; in another, this condition is but slightly marked; in a third, it is absent; and yet, on dissection, you find a similarity of local lesion. Lastly, it may be argued that if typhus were symp-

tomatic of any particular local lesion, we should be able to cure it by removing that local lesion. This, however, is not always the case; that it sometimes does occur I am willing to admit, and this is therefore to be considered as the weakest of my arguments. But, on the other hand, if it be admitted that the local lesions are accidental and secondary, we can easily understand why their removal should not necessarily cause the removal of the fever. Such are the arguments on which I ground my objections to the doctrine — that all fevers are merely symptomatic of local disease; and in these views I think I am borne out by the opinions of the soundest modern pathologists.

But though we admit that local inflammations are secondary, and bear the same relation to typhus as the eruption of small-pox to the morbid state that precedes it, still they are not the less important; and it is by a careful study of them that we arrive at a key to correct and successful treatment. They are of great importance from being exceedingly common in fever; in fact, so common that their occurrence is the rule, their absence the exception. They are also, in the majority of cases, the cause of death, and this they bring about in two different ways. First, directly, as in a case of simple inflammation. A patient in fever, who gets an attack of violent enteritis, may die of it as well as if he got an attack of primary enteritis; or he may die of pneumonia coming on during the course of his fever as well as the man who dies of pneumonia from cold. Thus we see that the secondary inflammations may produce death directly. They may also produce it indirectly, by preventing the efforts of nature towards a favourable termination. You recollect I told you, that in fevers there is a strong tendency to terminate spontaneously and on particular days. Now, we find that this disposition is greatly impeded by the presence of local inflammation, so that local inflammation may operate to the destruction of life in two ways; either directly, by its intensity and extent, or indirectly, by preventing a critical termination.

This leads us to look still deeper into the matter. We find that these local or secondary affections may also produce a train of sympathetic phenomena of a very remarkable character. There is no reason why enteritis coming on during the course of a fever may not react on the economy as well as the enteritis from cold, which we know generally produces symptomatic fever. In the case of two patients, one, for instance, meets with some lesion of the intestinal mucous membrane, and, as a consequence, gets enteritis and sympathetic fever; another gets enteritis during the course of a typhus; in the one case, the local lesion plainly reacts on the system, in the other this is less apparent, but there is no reason to suppose that it does not produce some effect on the system in one case as well as in the other. The law appears to be this, that in almost all cases of fever there is a combination of the essential and the sympathetic fevers, the essential the result of the first cause, and the sympathetic the result of the local lesions which arise during its course. Indeed, nothing seems to be better established

than that local disease reacts on the system and prevents a critical termination. You will get a very good idea of this by considering the paroxysms of an intermittent. What are the periods in which an intermittent is most liable to terminate favourably? The earlier ones. What are the periods in which a favourable termination is least likely to happen? The later ones. Now what are the periods in which there is little or no accompanying organic lesion? The first or earlier. What are those in which there is more or less of organic change? The later, in which we generally find, on making a careful examination, that disease of some organ, or organs, has taken place, and is presenting an obstacle to a favourable termination. It is the same thing with respect to fever.

In the treatment of fever, it is a most important rule to investigate the condition of the viscera, and remove, if possible, any existing local inflammation. By this we accomplish a double purpose; we prevent the direct danger of death from the violence of local disease, and we obviate the inconveniences arising from sympathetic irritation. We give nature fair play, we reduce the case to a state of the greatest simplicity, we prevent the liability to new local affections, and we thus effect a great deal towards a favourable termination. It is an interesting and singular fact, and one dwelt on by the school of Broussais, that in many cases of fever the removal of the local inflammations is speedily followed by a subsidence of the fever. It is chiefly from this fact that they argue in favour of the opinion, that all fevers are symptomatic of local disease. This argument, however, as I have already proved, is more specious than solid. The true reason is, that by removing local disease we remove the barrier which opposes the salutary operations of nature. Every attempt at a favourable termination is impeded by the coexistence of local disease, and the more intense and extensive this is, the greater is the obstruction. You are not by any means to conclude that a fever is symptomatic, because it disappears on the removal of local disease; the true explanation is, that by subduing the local inflammation you have removed a focus of irritation, and given scope to the preservative powers of nature.

These I believe most firmly to be the true principles which should guide us in considering the subject of fever. They have been obtained by careful and accurate deduction, and are based on a numerous series of well conducted experiments. Weigh the matter calmly, and I think you will be disposed to agree with me, that fever in its origin implies no tangible condition of the system, and that we know it only as consisting of a group of phenomena, varying as to their cause, seat, effect, and duration. The humoralists erred by fixing its seat in the fluids, the solidists by limiting its locality to the solids. We recognise no distinction between the fluids and solids, so far as fever is concerned; they all form parts of the great whole; one cannot act without the other, but their mutual reaction is extensive and various. From these considera-

tions we deduce the important rule, that there is no mode of treatment universally applicable, and the man who treats fever with wine and stimulants only, or he who contents himself with purgatives and diaphoretics, or he who limits his practice to leeches and the lancet, that man knows nothing of fever. Though his hair be gray and his authority high, he is but a child in knowledge, and his reputation an error. On a level with the child so far as a correct appreciation of the great truths of medicine is concerned, he is very different in other respects; his powers of doing mischief are greater, he is far more dangerous. Oh! that men would stoop to learn, or at least cease to destroy!

LECTURE XCVII.

Intermittent Fever—Definition and character of—Phenomena of the paroxysm—Cold stage—Internal congestions—Pathology of—Hot stage—Ague not a simple fever—Affections of various viscera—Theory of Broussais—Effects of bark, quinine, &c.—Modus operandi of.

To-day we commence the consideration of intermittent fever. One of the most prominent characters of this affection is expressed by its name; we have all the phenomena of fever making their appearance at certain periods, and then disappearing, leaving an interval in which the constitution seems to be in the normal state, and continues so until the supervention of a second attack. It has been also termed a primitive or essential fever, in which there is no original local disease, and where the fever, in the beginning, is not symptomatic of any local lesion. We may define intermittent fever as a primitive, or essential fever, composed of many paroxysms which recur at certain periods, and in the intervals between which we have a state of apyrexia, or freedom from fever. This definition, though applying to the great majority of cases, is still to a certain degree imperfect, for we meet with examples of this disease in which the periods of attack are by no means regular or certain, and the state of apyrexia between the paroxysms not well marked. Thus, in two cases of intermittent, we observe that in one the patient appears, during the interval, to be completely free from fever, while in the other we find that the febrile symptoms continue to a certain extent after the subsidence of the paroxysm. As a general definition, however, the foregoing is tolerably good, and will be quite sufficient for practical purposes.

Another remark to be made on this subject is, that an intermittent is not necessarily an essential fever. We may have it from lesions of various kinds. You are all familiar with that form which attends bad cases of stricture and retention of urine, and which has been called urinary fever. Here we have fever of an intermittent character, not essential, but depending upon a local

lesion. We have many other instances of a similar kind, and I could easily multiply examples.

I shall not take up your time by entering into a description of the various divisions of intermittent fever; it is a species of knowledge unconnected with any point of great practical importance, nor does an acquaintance with the nature of the disease, so far as frequency of paroxysm is concerned, shed any useful light on its treatment. The same principles of treatment are applicable to quotidian, tertian, quartan, and every other variety of intermittent. Besides, we know nothing whatever of the nature of an intermittent. We are here as much in the dark as we are in the case of continued fever. We are still in complete ignorance as to the cause of the periodicity which is so remarkable a feature of this as well as of other diseases. It is enough for us, in the present state of medical science, to know that such things exist, and, leaving the researches after the cause of the disease and its periodicity to future investigations, let us study the effects of the disease, and direct our attention to things within our reach.

Let us, as far as we can, examine what takes place during the paroxysm of an intermittent. I think it my duty, as a lecturer on practical medicine, to direct your attention to this point rather than to the history of intermittents; this is, I grant, not devoid of interest, but it is a subject on which you will find ample information in the various systematic treatises on medicine. My intention is to endeavour to point out the true principles of treatment; I shall, therefore, enter no farther into the history of intermittents than what is connected with diagnosis. This will certainly diminish the interest of a lecture on intermittent fever, but this cannot be helped; it would, in a limited course of lectures like this, be quite out of my power to lay before you the mass of curious and instructive matter connected with the history of intermittents. The paroxysm of an intermittent fever has been divided into three stages — the cold, the hot, and the sweating; but it simplifies the matter very much, to consider it as divisible into two stages, the sweating being the result of the hot stage. With respect to the cold stage, I shall endeavour to establish three great propositions. In the first place, it appears (and this is highly important) that, in the majority of cases (I do not say in all, for there is no general rule in medicine), there is, during the cold stage, a perceptible lesion of one or more internal organs, and that there is congestion of many, if not of all, the viscera of the three great cavities. To use a modern phrase, we have, during the cold stage of an ague, a state of hyperæmia of the internal and anæmia of the external parts, or, in other words, the balance of the circulation is lost, the blood forsakes the surface and accumulates in deep-seated organs. The next proposition is, that this hyperæmia, from frequency of repetition, or excessive violence, may be accompanied by, or productive of, an inflammatory condition of these organs. Lastly, that organs thus altered may in themselves become sources of irritation,

react on the system, and powerfully tend to keep up disease. You see, then, that, in considering the phenomena of intermittent fever, we must follow the same road as in continued fever, and regulate our inquiries more in relation to the effects than the cause of the disease.

The first of these propositions — that during the cold stage of an ague there is a congested state of almost all the viscera — is proved in every way that a pathological proposition can be proved. It is confirmed by an examination of the symptoms, by the results of treatment, and by the appearances seen on dissection. In this country, we very seldom have an opportunity of examining the bodies of patients who have died in the cold stage, for the intermittents of this country are trifling in comparison with those which are observed in warm climates. But the fact is fully borne out by an examination of those who have died in this country under such circumstances, as well as by the more numerous examples occurring in countries in warmer latitudes. Let us take the different parts of the system during the cold stage, and see how far the symptoms point out an accumulation of blood. First, let us review the nervous system. There is a feeling of tension and fulness about the head, the patient complains more or less of headache, the sensibility is diminished, and there is frequently stupor and coma, and in violent cases there may be convulsions. All these circumstances are indicative of congestion of the brain; and accordingly we find, where we have an opportunity of making an examination, that the venous system of the brain is in a state of engorgement. In some cases, the carotids and their branches have been observed full of dark-coloured blood, the congestion of the lungs having interfered with the process of aëration. In the intermittents of warm climates still more remarkable effects have been witnessed — enormous congestion of the vessels of the brain, and frequently effusions of blood into its substance; so that the symptoms during life, and the appearances seen after death, tend to confirm the fact of congestion, so far as the brain is concerned. If we turn to the pulmonary system, we find that nothing is of more common occurrence, during the cold stage of an ague, than lividity of face, anxiety, cough, and hurried breathing; and when we come to examine the chest, we find more or less dulness of sound on percussion, and the other physical signs of congestion of the lung. This is further confirmed by dissection; the lung is congested, and of a dark red colour; it will often sink in water, and presents a condition closely bordering on hepatisation. If you examine the heart, you will find that its action is oppressed, the pulse is small and irregular, and the right ventricle, with the vessels attached to it, are found engorged. Proceeding to the abdominal cavity, we find the same indications of congestion. There is a sense of pain and fulness in different parts of it; the patient has vomiting, often diarrhœa, and a copious discharge of urine; all this shows a violent determination of blood. You have often heard of the tumefaction of the

spleen which accompanies the cold stage of an intermittent. Now, so rapidly does this occur, and so extensive is the engorgement, in many instances, that shortly after an attack we can readily feel and trace it distinctly. On dissection, we meet with abundant proofs of congestion; we find the liver highly engorged, the intestinal mucous membrane very vascular, the mesenteric and portal veins filled with blood, the kidneys congested, and the spleen enlarged. Cases of rupture of the spleen, from excessive congestion during the cold stage of ague, and of hepatic apoplexy from the same cause, are described by Bailly. These facts are sufficient to prove the truth of the first proposition — that, during the cold stage of an intermittent, most of the internal organs are in a state of congestion. We are led to suspect this from the symptoms, and our conjectures are confirmed by dissection. Indeed the most superficial observer must be struck with the remarkable retreat of blood from the superficial parts of the body. The skin is pale and shrivelled, the bulk of the limbs diminished, the countenance collapsed, the whole surface cold, and superficial vascular tumours are observed to lose their vascularity and become reduced in size. All these circumstances lead us to the supposition of internal congestion, and this is corroborated by the results of dissection, which show the various internal organs in a state of hyperæmia, and shows the retreat of the blood from the surface, and its accumulation in deep-seated parts.

The next proposition is equally important — that the frequent repetition, or excessive amount of these internal congestions, may, and does, give rise to an inflammatory condition of the affected organs; in other words, that the hyperæmic condition of certain viscera, during the cold stage of ague, and their subsequent organic lesions, stand in the relation of cause and effect. We find that the effect produced by the cold stage on the viscera is twofold; we may either have congestion independent of any organic change, or we may have inflammation. In some cases, particularly in those which occur in warm countries, the congestion is followed by violent inflammation; in others, as in the cases of this country, we have chronic inflammation produced. But whether we meet with one or the other, whether the inflammation be acute or chronic, we find that, as soon as the viscera become affected in this way, a state of constitution is brought on in which the power of the usual remedies is diminished, and their use frequently prejudicial. New local inflammations are set up in various organs, *and these, which were in the beginning only the effect of the disease, become by reacting on the system, the cause of its continuance.* In warm climates, where the congestion is excessive, there is nothing more common than to see fatal pneumonia, or violent gastritis, or rupture of the spleen, or cerebritis, supervening on a bad attack of ague. Strictly speaking, the production of inflammation in organs seems to belong more to the hot than the cold fit, and this we can easily understand. In the cold stage, the viscera are in a state of intense

congestion; violent reaction then comes on with the hot fits; and when we have in any organ a stasis of blood, and violent action of its vessels, occurring during the existence of this stasis, it is not surprising that inflammation should be the result.

In the hot fit, all the phenomena, which we have been just now examining, are reversed. Everything indicates that the energy of the circulation is about being restored, and that there is a powerful determination to the surface. The pulse gradually rises in strength, the rigors gradually disappear; the skin, which was cold and shrivelled, becomes hot and tense; the face, which was blanched and collapsed, assumes a full and flushed appearance; the cough and hurried respiration are relieved; the vomiting, diarrhœa, and discharge of urine, ceases; and the stupor is removed. The vessels on the surface of the body becomes more and more distinct; and in those who have large superficial veins, those vessels (though there was no appearance of them during the cold fit) stand out in bold relief like so many thick cords. I have alluded before to the greater severity of the cold fit of the intermittents of warm countries; the hot fit exhibits a corresponding degree of intensity. The cold fit is generally accompanied by violent vomiting and purging, spasms and convulsions: the hot stage is attended with fits resembling apoplexy, and is frequently succeeded by intense pneumonia, cerebritis, and other forms of visceral inflammation. Such occurrences are rarely seen in the fevers of this country.

The great principle to be borne in mind with respect to intermittent fever, is, that during the cold stage the viscera are in a state of congestion, and consequently fitted for the reception of disease. When the hot fit comes on, this state of congestion generally disappears; but if it should continue, we shall have a chance of inflammatory action being set up in one or more viscera, and in this way we may have a number of points of irritation in the system, complicating the original affection, and tending to retard the operations of nature and art towards a favourable termination. You can easily understand, that if the lung, which has been in a highly congested state during the cold stage, does not, during the succeeding hot stage, throw off the load of blood completely, it will be less able to accomplish this at the next attack, and so on, until at length the process of inflammatory alteration is firmly established. The same observation applies to the other viscera. In some cases, just as in continued fever, we have the brain chiefly engaged, in others the lung, in others the digestive system; and, in the intense agues of tropical climates, we often have the three great cavities simultaneously attacked. You will observe here, that the production of visceral disease depends on two circumstances — first, on the intensity of the congestion, and, secondly, on a frequent repetition of the attack where the symptoms are less violent. In this country, the latter seems to be the principal cause.

From these considerations, we come to the important law that, after some time, we are not warranted in looking upon ague as a

simple fever, but as a fever of a compound nature, involving affections of many important viscera, to which we must attend carefully, if we seek to practise with safety and success. It is singular, that the majority of medical men appear to look upon the effects of an intermittent as being very circumscribed. You have all heard of enlargement of the spleen. Now, I have known some practitioners who appeared to think that this was the whole pathology of intermittent fever; in fact, that there was a very close connection between enlargement of the spleen and ague. This, I need not tell you, is a very imperfect view of the question; the spleen suffers like other viscera, but there is no separate relation between its enlargement and the production of intermittent fever. The reason why attention has been chiefly directed to it is, because its lesions are generally more manifest than those of other viscera. It is composed of a loose, spongy, erectile tissue; it receives in its natural condition a great quantity of blood; it becomes rapidly and extensively enlarged during the cold fit; and hence it becomes a very prominent and remarkable sign of the disease. But I believe that in all cases where the spleen is found to be enlarged you will also be able to detect disease of the liver or lung. All the viscera are more or less liable to suffer under similar circumstances; there is, in a word, no single acute or chronic disease which may not be the result of intermittent fever. In this country, it generally gives rise to chronic disease; in warm climates, acute visceral inflammation is more commonly the result. Here we arrive at another very important consideration, namely, that it may happen that the phenomena of an intermittent shall cease, and yet the chronic disease produced by the violence or persistence of the original malady will continue. This is exceedingly common. We frequently meet with chronic disease of the heart, lungs, or brain, with dysentery, diarrhœa, peritonitis, affections of the kidney, and chronic inflammations of the liver and the spleen, brought on by intermittent fever, in this country. These local affections are the result of violent congestion, and the continued irritation which accompanies the early paroxysms of the disease; and though the symptoms of ague may subside, the morbid irritation, which has been set up in the constitution, may proceed to such an extent that death may be the result of a complication of visceral affections thus produced; and this I believe to be the history of many chronic cases of ague. Chronic affections of the lung, liver, brain, and digestive system, are, then, the chief things to be dreaded or guarded against in a case of intermittent fever; for after all that has been said about the enlargement of the spleen, it seems to me to be the least important of the visceral lesions which follow ague. It appears in almost every instance (at least as far as we can see of it in this country) to exercise but very little influence over the economy. In warm climates, indeed, it is sometimes so much enlarged as to produce serious inconvenience by its pressure and bulk. Thus, in South America, it has been observed, that in bad cases of ague the spleen

has become so enormously increased in size as to fill nearly the whole abdominal cavity, producing great derangement of the digestive organs, and actually hernia. Dropsy, jaundice, chronic hepatitis, diarrhœa of an intractable character, various nervous affections, amentia, an atrophied state of the system, phthisis, hectic, typhus, all these constitute part of the morbid affections which follow in the train of ague as it appears in this country, and all will be found connected with various chronic visceral lesions which have been the immediate results of the original disease.

When called to treat a case of ague which has been going on for some time, you will generally meet with one of two things; you may find that the viscera have, or that they have not, suffered much from the effects of congestion. Now, when organic changes of viscera take place, we have the remarkable circumstance of their active tendency to keep up the original malady. Here you will frequently see practitioners prescribing bark, and if you watch its operation, you will sometimes find that it does more harm than good. But if, on the other hand, attention be directed to the local lesion, neglecting the intermittent for some time, you will find that the removal of the local disease brings back the intermittent, more or less, to its original state of simplicity, and renders it amenable to the specific. Observe the importance of this. The same rule holds in intermittent as in continued fever; you must practise with an eye to the state of the viscera, and recollecting that the disease, which results from one, as well as the other, may be, in its turn, cause and effect. Here I shall take an opportunity of making a few observations with respect to a theory of intermittent fever which has been put forward by such high authority that we cannot pass it over. I allude to the theory of M. Broussais, in which he endeavours to show that intermittent and continued fevers are reducible to the same form, namely, an irritation of the digestive system. To this view of the question a great many facts are opposed, all tending to prove that disease of the digestive system (which is so common in intermittent as well as continued fever) is to be looked upon more as an effect than as a cause. It is absurd to say that intermittent fever is merely an intermittent gastro-enteritis, when dissection shows that we have not only disease of the digestive tube, but also of the heart, lungs, and brain. The fact of coexisting visceral inflammations was passed over by M. Broussais, and certainly it must be acknowledged that this is a very simple mode of getting rid of a strong objection. His doctrine was, that fevers, intermittent as well as continued, are only examples of the effects of irritation of the digestive system, the continued fever being significant of severe and extensive disease, the intermittent of an affection of a milder character. He also maintains that the rigors are produced by, and proportionate to, the internal irritation. Now, admitting, for argument's sake, the two first propositions, what do we find to be the fact? That in continued fever, where the irritation is greatest, the rigors are compa-

ratively trifling, while in the intermittent, where the irritation is less violent in degree, the rigors are remarkably intense. Here we see intense rigors, with slight disease, and trifling rigors with intense disease, two facts strongly militating against the proposition of M. Broussais.

Another argument may be urged againt these doctrines: I allude to the effect of bark. This is a point which very much puzzled the physiological school, and they have accordingly exerted all their ingenuity to explain it away. At first, I believe, they were strongly inclined to deny altogether the specific powers of this remedy; they were subsequently, however, compelled to subscribe to the fact of its efficacy, which was too notorious to be denied, and they had then to explain how bark could cure a gastro-enteritis. Hard as it was to explain how bark could be instrumental in removing gastro-intestinal inflammation, it was a matter of unavoidable necessity to attempt something like an explanation, in order to maintain the integrity of the physiological doctrine. They therefore set about the task, and endeavoured to show that bark cures the ague, or its cause, gastro-enteritis, by substituting one irritation for another. The whole gist of their arguments is founded on this point:— quinine, they say, is a stimulant; ague is the irritation produced by gastro-enteritis. Now, it is a fact that stimulants will frequently remove existing irritations; thus, we frequently observe, that blennorrhagia, chronic ophthalmia, and diarrhœa, are cured by stimulants. This argument, however, is more specious than solid. There are certainly cases of irritations of mucous surfaces which may be removed by stimulants, but these are cases of *chronic and not of acute disease.* No one would dream of employing stimulants in a case of acute febrile diarrhœa, few would think of applying irritants to an acutely inflamed and painful conjunctiva; it is only when the character of the inflammation alters, and the affection acquires more or less chronicity, that these remedies prove at once serviceable and safe. Now this is not the case in ague. If it depends upon an acute gastro-enteritis, we are, according to this line of argument, to conclude, in the teeth of their other doctrines, that the best mode of curing an acute attack of gastro-enteritis is to stimulate the inflamed mucous surface. Here, you see, we arrive at the argument *ad absurdam.* Another observation on this subject:— In a case of intermittent fever, supposing it to depend on gastro-intestinal irritation, it is a matter of indifference whether you give the bark during the paroxysms or during the intermissions. Now, it is a matter of experience, that bark will be far more effectual when given during the intervals of apyrexia. Again, if bark cured by producing a new irritation, we ought to see the symptoms of that irritation succeeding the administration of the remedy.

Thus, whether we look to the symptoms, the appearances seen on dissection, or the results of treatment, and the efficacy of bark, we must conclude that the morbid state of the digestive system stands in the relation of effect, and not of cause. As far as we can

judge of ague, it appears to be some profound alteration of innervation, some affection of the whole system, the nature of which we cannot understand, but the effects of which we perceive in the various derangements of internal organs by which it is attended. Intermittent fever is not intermittent gastro-enteritis, because dissection reveals various other important lesions, and because it is cured by bark, which has nothing in it calculated to remove acute inflammation. We know that if a patient labouring under ague has acute inflammation of the stomach, bark, so far from curing, will do him a great deal of harm. Bark cannot cure by exciting irritation, because, if it did, it would increase the supposed gastro-enteritis, and we should have more violent symptoms during the intermissions, the time when it is always given, than during the paroxysms. Lastly, there is no analogy between the effect of stimulants on acute and chronic inflammations. What the *modus operandi* of bark is, we cannot explain. Many things, connected with the phenomena of life in health and disease, are and probably will for ever remain concealed from human ken. We daily witness the effects of stimulants, but we cannot explain their mode of action. This, however, is no opprobrium to medicine. This is the right way of viewing the subject; part of it is capable of admitting an explanation, the rest constitutes a portion of the inscrutable arcana of nature. It fortunately happens, however, that, for all practical purposes, the knowledge of these occult portions of medical science is as yet comparatively unimportant.

LECTURE XCVIII.

DR. BELL.

Alleged Cause of Intermittent Fever—Miasm, or malaria, an imaginary cause—More attention due to sensible states of the atmosphere—Slight difference in location modify climate—Direct cause of disease among labourers in the *Campagna di Roma*—Causes of continued fever.—*Phenomena of fever—Periodicity*—Ascendancy of the nervous system—Simple intermittent—Bark or sulphate of quinine, sufficient remedy—Opium to ward off a paroxysm—Narcotina as an anti-periodic—Splenic congestion to be removed by quinia—Complication of gastro-enteric disease and congestions with intermittent fever—Routine or a too exclusive practice—The proper eclectic course—Venesection, when proper, and mercury,—as preparatives not substitutes for quinia,—Anæmic state requiring iron with quinia—Cold bathing, when proper.

I shall imitate the wise reserve of Dr. Stokes, in abstaining from disquisitions of a merely historical or speculative nature on intermittent fever. A period of several years has now elapsed since I recorded my disbelief in the hypothesis of this variety of fever, and indeed of periodical fevers generally, being caused by marsh air, or by any separate, peculiar, or specific emanation from the soil of marshes or from decayed vegetable matters, designate such cause by whatever term you choose, miasm or malaria. There are no circum-

stances assigned as competent to its evolution which, often, are not found without such result; and *e convèrso* it is claimed to be present and operative in the production of periodical fever when the commonly assigned circumstances or conditions are wanting. Bancroft tells us, that a humid soil abounding in vegetable remains, and acted on by heat, the range of which is from 45° to 100° Fahrenheit, is the most favourable for the extrication of miasmata. This process is said to go on very slowly while the mercury continues below 45° F., and to be checked when it goes beyond 100° F. These conditions for the evolution of a febrific principle seem to have been made to suit northern latitudes, or climates commonly termed temperate; but if they were real, then ought the inhabitants of tropical regions, as the West Indies and the western coast of Africa, to be afflicted by intermittent and remittent fevers during the winter, and exempt from them during the summer and autumn, for, in the first of these seasons, the average temperature is about 70° F., the most favourable, according to Bancroft, for the evolution of miasm; and in the latter the soil is exposed to a heat of 120° to 140° F., a heat which he tells us checks its evolution. Now the facts of the occurrence of febrile disease are directly the reverse of the hypothetical assumption in this case. There is comparative exemption from periodical febrile disease during the alleged miasmatic season, and a large occurrence of them during the period of alleged immunity.

Periodical fevers have originated and prevailed extensively in argillaceous soils, where no vegetable putrefaction was going on, nor at all suspected (*Chisholm — Medical Topography of the West India Islands*). So much importance did Linnæus attach to such a locality as this, that he wrote his inaugural essay, *Hypothesis nova de febrium intermittentum causâ*, to prove that periodical fevers originated in all those places where the soil abounds in clay, and only in such places. Von Aenvank of Louvaine, in the same belief, has endeavoured to account for the prevalence of those fevers in an argillaceous soil, by supposing it to possess the property of absorbing oxygen from the atmosphere, and thus impairing the purity of the latter.

Periodical fevers are met with in mountainous districts where the usually alleged sources of miasm are not seen. In the interior of some of the West India Islands, at an elevation of five or six hundred feet above the level of the sea, amongst a series of mountainous ridges, not directly exposed to currents of exhalations from swampy and low grounds, the form of disease is sometimes intermittent, sometimes remittent or continued, more generally dysenteric or ulcerative (*Robert Jackson on Fevers*). Intermittent fevers have prevailed with violence in dry sandy soils, as in Dutch Brabant, according to Pringle. Intermittents have been brought on by various crude ingesta (*Frank, Senac, Rubini*), by cold (*Alibert*), and by local irritation, (*Giannini Delle Febbri*), without the persons thus suffering having been previously exposed to marsh effluvia. These were

some of the facts which I adduced against a belief of the existence of miasm seventeen years ago; and which, in connexion with the numerous fallacies and contradictions in the arguments in its favour, led me at that time to a public declaration of my sentiments on the subject, in a paper entitled *On Miasm as the Alleged Cause of Fevers*, in *Dr. Chapman's Medical and Physical Journal*, 1825. I felt that I was the more earnest in my opinion of dissidence from the received authorities of the day, because I reached it without prior purpose, when I was preparing lectures on endemic influences as illustrative of the ætiology of disease, and especially in connexion with miasm; of the accuracy of the doctrines respecting which I, at the time of beginning my investigations, entertained no doubt.

Nor can I profess greater belief in the doctrines of the volcanic miasmatists than in that of their vegetable and vegeto-animal decay predecessors. The evolution and operation, in the production of fever, of a subtle agent, termed miasm or malaria, is a purely gratuitous supposition, unsustained by direct evidence, seldom made plausible by analogies, and one which certainly does not advance us a step in the theory of the causation of fever beyond the results reached by our earlier masters in medicine, who were generally content to assign as causes the extremes, alternations and vicissitudes of the sensible states of the atmosphere, — measured by its heat and coldness, dryness and moisture, density and rareness, different conditions of its electricity, and the force and continuance of certain winds. Each climate, and each season, the latter representing in a great measure a particular division, has its disease, or groups of disease; and he is either a singularly keen observer and successful reasoner, or very bold in reaching conclusions, who can deny the power of atmospheric extremes and alternations in one class, and admit them in another; or who, on the other hand, can see an uninterrupted chain of causation for any one disease. Surely the obvious causes of intermittent fever, in cold and moisture of the night succeeding heat and dryness of the day, acting on a body predisposed by excessive labour, impoverished diet, or intemperance, to say nothing of the operation of disturbed mental faculties, will go as far to explain the effects which follow exposure to these causes as cold acting on a person previously heated does in explaining the occurrence of a pleurisy, or a combination of atmospherical influences and defective nutriment acting on a predisposed body does in enabling us to understand the ætiology of tubercular disease.

In pathology, under which head I include ætiology, from which late writers have chosen to disjoint it, the plain and easily found, that over which we almost stumble in our progress, is doggedly overlooked in the gaze at some meteoric illumination, or peering into a mist, as if we could see through it all the objects of our search. The same error is often committed in other branches of scientific research. It is not long since the chief causes of disease were alleged, by some systematic writers, to consist in a perturbation and unequal distribu-

tion of the animal spirits, acrimony of the fluids, &c. Now, discarding the mystic, we look at the material, and believe that we have gained immensely by the different direction which our inquiries have taken, and by the objects and subjects investigated. So ought it to be in the observation and study of external causes of disease. Miasm or malaria is as little satisfactory in our reasonings on general pathology, as vapour or a subtle fluid, accumulated in some organ and causing it to inflame, would be in special pathology.

It has been alleged in defence of assuming unknown agencies, in our exposition of the causes of periodical fevers, that the known ones are inadequate to the production of the alleged effects. We grant that heat will excite and cold depress, say the miasmatists, but their effects separately, or in alternate operation, are not analogous, certainly not identical, with those attributed to malaria, which acts in a peculiar or even specific manner upon the nervous system, and most probably also on the blood, by diminishing its vitality and preventing its unequal distribution, whereby come congestions and engorgements. But, if these persons were to see, as I have, more than once, a poor man dying from a sun-stroke, they would discover, in the rapid breaking down of his solids and the deterioration of his fluids, made evident by the smell of putrefaction from his body, that one property of atmosphere had an influence as potent as miasm itself. Take, on the other hand, diseases, the product of cold, when it unequally and irregularly, yet for a length of time, operates on the human frame, and what are its results? The scrofulous, the anæmic, the sufferer from both acute and chronic pulmonary disease, and from hybrid articular inflammations, and the victims of fever itself, can answer.

A more minute observation of the differences of temperature and moisture, we might almost say of climate, with apparently very slight differences in locality, would go far to dispel the idea of the inadequacy of these patent agencies in the production of fevers as well as of some other diseases. In the same town, as in Montpelier in France, for example, the part facing the south, and measurably protected by a hill from the northerly winds, enjoys a different climate from that other part which is exposed to these winds and their accompanying chill and coldness. An artificial terrace, the different sides of a street even, will give such differences of solar exposure as to be equivalent to broad contrasts in climate. In the account of the influenza which prevailed in England in 1803, by Dr. Carrick, we learn that the inhabitants of that side of Richmond Terrace, in Clifton Hill, near Bath, which fronted the east, were universally attacked with the disease; while on the south side, the great majority, both of persons and families, in all other respects similarly circumstanced, escaped it entirely. Two persons, who spend their day and sleep in the same house, will yet, if one live in rooms with a southern and the other in rooms with a northern exposure, be subjected to very different degrees of temperature and dryness of the air of their apartments, and

will, in consequence, be constitutionally modified in the course of a twelvemonth, or even of a winter, to as great an extent as if, during the same time, one of them had lived in Italy and the other in England; or one in New York and the other in Charleston. We suppose that both of them sleep without fires in their chambers. Now, here are two persons whose diet may be the same and their exercise out of doors nearly alike, but whose susceptibility to the operation of morbid causes has become very different by the mere interposition of a wall between them, by which the exposure of one to the light and air is north and that of the other south.

It is a source of marvel that a family in a house situated near a mill-pond should be affected with ague and fever every year, when another family living half a mile off escapes entirely. How, say the miasmatists, can you explain this contrasted result by any notable difference in the sensible qualities of the air; and must we not have recourse to the admission of an occult cause, — miasm or malaria? Why not assign as the cause the last discovery, made in Western Africa, of sulphuretted hydrogen being the deleterious agent? If this were the case the people would be sorely afflicted with periodical fevers in large cities. But first let us ascertain the extent of the known before we give up ourselves to imaginings of the unknown. A few yards, more or less, of rank grass, or a shrubbery, in place of gravel walk, will create differences of a climatic nature to those who stand, or still more, who lie down, a few hours near them. Let two men stand sentinels for a night, separated from each other by a few yards only, clad in all respects alike from head to foot; but the one be in the centre of a grass-plot and the other on a rocky soil, or even gravel walk. The cold and moisture to which the first will be exposed are greater by many degrees than the latter, owing to the radiation of caloric from the vegetable growth and the formation of dew or precipitation of moisture in consequence, and he will be much more susceptible to even common physiological stimuli in the morning than the other person. Let a person who is lightly clad pass, during his walk late of a summer evening, from an open gravelled or paved space to one covered with grass and shrubs, and he will in a moment experience a chilly feeling, which, if he were to remain stationary long on the spot, would end in a regular chill, followed, on his reaching home, in the morning, by reaction or morbid heat, and afterwards a moist skin. I would recommend you to read *Wells on Dew* preferably even to Bancroft's essay on *Yellow Fever*.

The poor labourers of the *Campagna di Roma* are exposed during a long day to the sun's heat, and when night comes with its coolness and dews they undergo another exposure, from which their miserable huts and scanty covering of clothes fail to protect them. Their nervous system necessarily suffers after a few alternations of solar excitement and nocturnal sedation, and fever is a natural conse-

quence: it is the more readily induced, because nutritive excitement, as the best protection against external morbid causes, is deficient in them. Their food is poor, chiefly vegetable, and that wanting a due proportion of glutinous and farinaceous principles. This picture will serve to represent the condition of many of our countrymen on plantations and farms at home, with the difference in their favour of more abundant and substantial food, and against them of alcoholic stimulation and consequent indirect debility. If the fever from which persons thus exposed suffer were the product of the subtle poison of miasm, few in the regions in which it is evolved could escape its power; but when we find the richer Romans spend the season in their châteaux without being attacked, and that even their poorer neighbours, who protect themselves from the effects of sudden atmospherical changes by wearing flannel next the skin, and persevere in keeping their houses dry, are equally exempt, we cannot attach much importance to this imaginary cause, to the exclusion or oversight of the appreciable distemperatures of the air and often concomitant poverty of diet.

Periodical fevers are most frequent and violent in climates and localities, and during or immediately following the season of the greatest contrasts and alterations in the sensible states of the atmosphere. The modifications of these states will depend much on the nature of the soil itself, as in its being bare or clothed with herbage, on its contiguity to water, on exposure to particular winds, and partial currents of air either out of doors or in a house. Protection from disease will be just in proportion as the inhabitants guard against extreme vicissitudes of season and weather, the noonday sun and the evening dews and coldness, rain, and easterly winds, and personal exposure, by dwelling and sleeping in damp apartments, being imperfectly clad, and neglecting the rules of regimen.

If we extend the inquiry into the causes of continued fever, and especially of typhus, are there not obvious agencies at work without invoking contagion or miasm from the living body? Do not the damp cellars, or other close and ill-ventilated lodgings of the crowded poor, poisoning each other with the exhalations from their persons, and the not always removed excretions of the children and the bedridden; their scanty and deficient food; overtoil or drunken languor, constitute causes adequate to produce fevers of the worst grade; when ever so slight a difference, in the character of the season or additional stint of food occurs? One great and a serious disadvantage of the malarious or miasmatic doctrine is, that it leads to, has actually caused, a neglect of all that course of observation of the circumstances modifying both the physical and moral nature of man, which distinguishes a Hippocrates and a Sydenham, and others who have travelled in their footsteps. Another disadvantage as respects the people generally, is that, hopeless of shunning this subtle agent, malaria, or their heads filled with speculation and contradictory notions of its origin and nature, they either fail to adopt any proper precaution, or they have recourse to it in the wrong spirit and in an inefficient manner. They think that they must of neces-

sity either inhale this miasm, or, according to others, swallow it, and amid their fears and their anxiety they overlook the simple and old-fashioned means of protection against diseases, the products of atmospherical mutations and extremes. Differently impressed and taught, they would know that if their cutaneous surface be adequately protected from a sudden reduction of temperature and currents of cool air, by flannel next the skin, and correspondingly warm outer clothing, they may breathe the air of the most malarious district with as much freedom as they would that of the third zone of the mountain of Teneriffe; and that, if they use wholesome food at seasonable hours, and procure a regular state of the bowels, they may subject their food to as prolonged mastication and insalivation as they choose without any apprehension of swallowing miasm with their saliva. They ought also to learn that, worse by far than inspiring marshy air, or swallowing as much as can be incorporated with their saliva, during the autumnal months, will be sleeping one night between damp sheets, or in a damp and cold room, however carefully all the outer (*malarious*) air may have been excluded for days previously. One more fact of importance ought to be impressed on their minds, viz., that exposure to a noontide sun, pouring down its heat and light with relentless power, is perilous, even though they may be told that at this time miasm is volatilised and rendered in a great degree innocuous. The absence of miasm will not give them immunity from headache, feverish heat and feverish thirst, followed by some languor and lassitude, and a proneness to be depressed beyond due measure by the coolness and humidity of the evening and night following.

In the winter, a man who gets cold, as the phrase is, or has his skin chilled, when it had just been perspiring freely, contracts angina; in the spring similar exposures will be followed by pleurisy; in the summer by cholera morbus or bilious colic; in the latter part of the summer by remittent or congestive fever, and in the fall by intermittent fever. In no one of these cases would the mere exciting cause be sufficient without antecedents. Is there, then, any more propriety or necessity for including malaria among these, in the last than in the first case? Not all they who are exposed to cold after heat in the autumn have intermittent fever in consequence; nor be it said in reply, do all they who are similarly exposed in the winter contract angina, or in the spring pleurisy. If the magic link of malaria be requisite to complete the chain of causation in one case, it is equally so in the others, — for all are equally defective; or if we assume entireness for one, the others are just as complete.

Phenomena of Fever.—The symptoms of fever have been already detailed and, to a certain extent, commented on by Dr. Stokes. It will be my aim in what I have to say on this subject, to show you the close connexion and affinity among all the periodical fevers — intermittent, remittent, and congestive, and that an analysis of the first or intermittent fever, a due appreciation of its several stages and the organic systems and organs affected by it, and the operation of remedies on these, prepares us fully at once to understand

the symptoms of remittent and congestive fever, and to direct with promptitude suitable remedies for their removal. I claim no novelty in this annunciation, nor any other merit than that of making you distinctly acquainted with a truth once generally admitted, now too often overlooked in quest of, I know not what, novelties and refined abstractions.

Periodicity. — First, then, as regards *periodicity*. A very slight knowledge of the part which the nervous system performs, and performs exclusively, in periodical disease, will convince us that the type of the fever, its characteristics — chills, diffused and high heat and sweat — will be manifested in consequence of simple irritation of this system. Intermission belongs to the nervous system, both in its several parts, and in its entireness in health, and its aberrations or exaltations in disease. We are most sensible of this in the nervous system of animal life, or of the cerebro-spinal axis and its nerves, including those of sense and motion — as in the alternation of sleeping and waking. But the fact is evident also in the functions of organic life, all of which, and notably those of digestion, have their period of alternate rest and of activity, — and of diminished and of augmented excitement. It is a strong proof of the necessity of periodicity to the nervous system, that although its irritants are in some cases ever present, its perturbations in consequence of the irritation are intermittent, and recur only after regular intervals. Epilepsy, coma, catalepsy, hysteria, though occasionally depending on fixed organic cause or lesion unsusceptible of change, are often not the less regularly periodical. A spicula of bone in the cranium, an imperfectly divided nerve, a neuroma, or ganglion pressing on a nerve, have each of them been abiding causes of epilepsy of a periodical character, in which there was as entire an interval of absence from any nervous or muscular disturbance as if the exciting cause had been completely removed.

Another peculiarity in the action of the nervous system is, that when once irritated there is a tendency to the recurrence of all the phenomena of the primary irritation, although the first exciting cause had not been present, nor its application subsequently renewed. Thus, the irritation caused by the introduction of a catheter, or even simple urethral irritation, as in gonorrhœa, has been followed by a febrile paroxysm, consisting of chill, reaction, and sweat, which returned after a stated interval, and finally required bark for its removal. Similar phenomena have been produced by daily immersion in a cold bath, and they have recurred for some days at the same hour even after desisting from the use of the bath.

As far, therefore, as periodicity is manifested in fever, we may be sure of the ascendancy, the direct government of the nervous system; and that on this system must our therapeutic impressions be produced if we would stop the return at stated interval of the paroxysm which constitutes the periodical character of the disease. Soon, it is true, there are complications with the simple nervous

disease. The congestion of the cold stage in place of being temporary, and giving place to the febrile reaction, may in a measure become fixed, and blood be retained in undue quantity in the capillaries and veins of the lungs or of the liver, and still more readily of the spleen and the mesenteric circle. This is the first and simplest degree of complication; but it is not sufficient to prevent the reaction, constituting the hot stage, and its termination in sweat, leaving the patient somewhat languid, indeed, but nearly in the rhythmic enjoyment of his functions. His appetite is not impaired; his digestion, if his stomach be not overloaded, is performed with tolerable completeness and regularity. It will be often sufficient for the cure of his fever that he abstain from any aggravating cause, which shall either depress or unduly excite the nervous system: or, undesignedly, the return of his paroxysm may be prevented by some strong impression made on this system, such as joy, hope, confidence, angry contradiction, or a sudden shock, as by the electric fluid in a storm, or by some great and unwonted muscular exertion. But more uniformly and safely will this desired result be obtained by the administration of some one or more articles of a class, or from different classes of medicines, the special operation of which is on the nervous system. Foremost and chief among all is Peruvian bark, or the salts of its chief alkaloid, quinia. Auxiliary to the main object, and adjuvant generally to the sulphate, or rather di-sulphate of quinia, is opium in some of its various forms. If we give the former in the shape of pill, we may very well combine the opium itself with it, as in this formula: —

℞. Di-sulphat quiniæ, ℈i.
Pulv. opii, gr. ii. M.
Et adde syrup q.s. ut ft. mass. in pil. x. dividend.

Of these, the patient may take one every two hours during the interval between the paroxysms. If the fluid form be preferred, the following prescription will answer very well: —

℞. Di-sulphat. quiniæ, ℈i.
Aquæ menthæ virid., ℥iv.
Acid. sulphuric., gtt. iv.
Sulphat. morphiæ, gr. ss.
M. ft. solutio.

Dose, a tablespoonful, or half an ounce, every two hours during the interval between the paroxysm.

Opium, or some of its equivalent preparations, has sufficed to ward off a paroxysm of intermittent fever, sometimes by its direct impression on the nervous system, where a full dose, as 50 to 60 drops, of laudanum, just before the expected return of the paroxysm has been exhibited; and at other times by its diaphoretic operation, and when it has been given in small and repeated doses with warm diluent drinks; the patient being in this case supposed to keep his bed during the period of using the medicine. Narcotina, one of the proximate principles of opium, has been used in

Calcutta for the cure of intermittent fever with considerable success; a result not referrible, however, to its narcotic virtue, of which it seems to be in a great measure destitute, nor to its stimulating operation, which it manifests in a low degree. Its use in intermittent fevers was suggested by its bitterness. All the bitters designated as tonics, and some not thus classed, such as the Faba St. Ignatii, have been prescribed with more or less success in intermittent fever. Much mischief has followed placing vegetable tonics as a sub-class of stimulants, with which, both in their sensible properties, at least as regards bitterness, and their physiological effect on the human system, they have much less affinity than with narcotic sedatives. This remark applies to Peruvian bark, and more especially to its alkaloid, quinia, as well as to bitters so called. It is worthy of remark, that arsenic, which next to the bark and its salts displays the most controlling influence over intermittent fever, as far as its great feature of periodicity is concerned, manifests its operation even in large and poisonous doses on the nervous system, the normal action of which it reduces, and finally paralyses.

In simple intermittent fever characterised by temporary congestion in the cold stage, temporary excitement in the hot, and crisis or termination by sweat, bark, or sulphate of quinia alone, or combined with opium, will almost always suffice to prevent the return of the paroxysm, and with it the recurring congestion. The same remedy is equally efficient in removing the congestion when it has assumed a more fixed character, as in an enlarged and tumid spleen, or liver, or even lung. In my Lecture (L) on *the Diseases of the Spleen*, when speaking of enlargement of this viscus associated with intermittent fevers of every grade, I stated that there is no remedy of equal efficacy to sulphate of quinia in full doses. I also remarked, and I repeat my language used on that occasion, although in anticipation of the treatment of congestive fever, that the control which the sulphate of quinia is found to exercise over enlarged and congested spleen, would of itself, even if direct testimony were wanting in favour of the practice, prompt to the free use of this medicine in congestive fever, although the spleen be not specially implicated. The whole portal circulation, in this form of fever, is in a state closely analogous to that of the spleen, viz., accumulation and obstruction of the blood in the immense venous meshes of the stomach, the intestines, and the liver. The kind of medication successful in one chain of this great circle can hardly fail of good effect in the others.

Another degree of complication of intermittent fever is with irritation and a certain degree of inflammation of the stomach or of the intestines, or of both. Here we have the same phenomena characterising the paroxysm as before; but its subsidence does not leave the patient free from disease. His tongue is loaded and somewhat red at the borders, and he has unusual thirst; he complains of a feeling of heat in his stomach, which is perhaps tender to pressure, and he has little or no appetite, if not a positive distaste

for food; his bowels do not perform their appropriate functions, and he complains of occasional pain, or suffers from flatulence and constipation, or sometimes diarrhœa. With some of these symptoms during the interval are often associated headache, and pain in the back or limbs. The skin is dry and harsh, and the renal secretion pale or red, and scanty. This disordered state of the economy sometimes precedes intermittent fever, and by some is regarded as a cause of this latter. Dr. Stokes has already exposed the fallacy of this belief, and I need not combat it here. But gastro-enteric disorder has been also followed by intermittent fever, and then by an equally false induction with that which supposed it to be a cause, it is said to be an effect of the fever. In a qualified sense both opinions have a foundation. The nervous system irritated by gastric disease becomes more prone to be disordered, and to give rise to the series of phenomena constituting a paroxysm of intermittent fever; as, in its turn, by exciting the capillaries and circulation, it may become a cause of gastric irritation and congestion. Can we in this mixed disease cure the intermittent paroxysm without attending to the gastro-enteric disease? Undoubtedly we can, and by the same means as those which we employ in simple intermittent fever, but with less certainty; for the nervous system is irritated and disturbed by the membranous disease, which is more than a mere dynamic derangement, such as the congestion of parenchymatous viscera. We have now a new train of symptoms, which are neither the simple exponents of an excited nervous system nor of the inflammation or congestion of particular organs, but a compound of both. We have to deal with a union of general nervous irritation, and inflammation of an organ or organic system, — a double disease, to be broken up by a double therapeutical attack, or by an attack with double means, — one directed against the deranged nervous system, another against the inflamed organ. We may remove the periodicity, the element of nervous irritation, by bark and its congeners, but the phlogosis will remain; we may carry off the phlogosis, but the nervous irritation and its periodical display in the febrile paroxysm will persist, and even be manifested sometimes with more violence than before.

Sometimes separate, as the winter approaches, and sometimes conjoined with gastro-enteric irritation and phlogosis, is similar disorder of the bronchial mucous membrane. In this last case there may be often a pulmonary congestion preceding and kept up with it; in the same manner as in the case of gastro-intestinal disease, there was precursory congestion of the spleen and liver. Often, after the fever has lasted some time, and if the patient has been careless in his regimen, and continued to expose himself to atmospherical vicissitudes, that which was simple irritation with congestion of the digestive mucous surface, becomes now phlogosis, which is participated in by the liver and measurably by the spleen; and we find, in consequence, a pulse of some tension and frequency during the interval of the paroxysms, a symptom which will be

more decided if there be coincident pulmonary disorder. There will be, also, pain in the right hypochondrium extending round to the epigastrium, a sallow complexion, yellowness of the conjunctiva, and other symptoms which seem to point conclusively to derangement of the liver.

Now comes a time of trial, if not of peril, for the patient. He is liable to farther suffering from the disease, and he is subjected to some risk from the treatment that may be directed by his physician. If bark or sulphate of quinia have been used up to this time, the continuance of the chills seems to call for increased doses of this antiperiodic; and if it fail to prevent the fit, other medicines, both vegetable and mineral, are had recourse to with similar intention; and the poor patient's stomach is subjected to a succession of stimuli, and not seldom of irritants, which still further derange, if they do not positively either inflame it, or increase existing phlogosis. Other practitioners, again, under the influence of a hepatic pathology, set about giving mercury in order to salivate, and thus "to cure the chills." Hardly, however, have they had time to boast of success, which at first rewarded their efforts, by the suspension for a while of the paroxysm, when they find the fever returning with, it is true, not as much violence as before,—only because the patient is weakened by the mercurial course. When in Canton and a sufferer from double tertian fever, and not in a fit state to take the bark, twice I put my system under the influence of mercury so far as to have my gums slightly touched. For a while the disease was suspended, but it soon reappeared on the first exposure of myself to night air, when administering for the diseases of others. So have I always found it to be in the few whom, without meaning it, I have salivated in intermittent fever — provided the bark or quinia were not given immediately afterwards in adequately full and repeated doses.

There is yet another mode of treatment at this juncture, such as I have described it, where there is some gastro-enteric disease, with hepatic and splenic congestion, and perhaps corresponding disorder of the pulmonary if not cerebral circulation. It consists in recourse to venesection, or occasionally, in place of it, local bloodletting. I can speak in terms of very decided commendation of this practice, to which, when yet a student of medicine in Virginia, I had recourse, in the case of a young man of a spare habit of body who had been much reduced by repeated attacks of intermittent fever. Bark and arsenic had been administered in vain. Influenced by the recommendation of Senac, whose works on Intermitting and Remitting Fevers I had just perused, I opened a vein in the arm of my patient during the next hot fit, and took away a pint of blood. The relief was immediate; the force of the paroxysm soon subsided; the apyrexia was complete; and a few doses of bark were sufficient to prevent the next fit. He speedily recovered his health and strength, and remained clear of intermittent fever.

From that time to the present I have not hesitated to use the lancet in every case of periodical fever, in which either the apyrexia was not so complete as to leave the patient entirely clear of all gastric and cerebral distress, or in which the paroxysms had been of frequent recurrence and untractable under the use of the bark. I have usually preferred, when the choice was in my power, bleeding during the hot stage to doing it in the apyrexia; but the experience of every additional season convinces me that in this latter state, also, the employment of the lancet will realize all our best hopes.

But let me not be misunderstood as an advocate for bloodletting to the exclusion of bark and tonics. No cure can be considered permanent unless this medicine or analogous articles be given; and every other means ought to be regarded as preparative or adjuvant to this *the* remedy in intermittent fever. Whoever relies on bloodletting alone, or on mercury alone, or on the cold bath alone, or on all these in due alternation for the cure of intermittent fever, trifles with the health if not the life of his patient, and manifests both an ignorance of the experience of the past and a blindness to the present. The opposite and extreme opinion and practice are equally reprehensible; as when no means of relief or cure are thought of, except in the use of bark or other bitters and astringents, and arsenic, and no other cause of failure is admitted than the want of power in the drug. Hence, if bark or its preparations fail, these empirics try bitters singly and in combination, or vegetable astringents with these: then mineral preparations, — of arsenic, iron, zinc, and copper: they run the round of the grossest empiricism, following the prescription of every professional friend, ransack books, confer with old women and nurses, and dream of nothing but of some new tonic, or new combination of old tonics, strengthened by various wines, tinctures, and the like. It never occurs to these good men, that excellent as bark and its congeners are, and indispensable for the cure, there are complications of visceral disease with the disorder of the nervous system that require a suspension for a while of the tonic course, and even the use of remedies of an opposite nature. Often, after the patient has been harassed by intermittent fever for weeks and even months, during all which time he may have been duly dosed with the most approved tonics in the most approved doses, a suspension of all remedies, of either the tonic or the stimulant class, — bark, and serpentaria, wine, and brandy, whether it be simple or medicated under the name of tincture; and abstinence even from common food, restricting himself to simple water for drink, and jellies or amylaceous articles for aliment, have been followed by freedom from the paroxysm and comparative comfort. But let us not, in a spirit of hasty generalization, proclaim, that intermittent fever is caused and kept up by gastritis or gastro-enteritis, and that leeches over the epigastrium and gum-water will suffice to cure it. Doubtless, if the poor patient has been stimulated for some time with highly-seasoned animal food and liquors, or has voluntarily kept himself half intoxicated, in order to be "a little above par," he will be

very liable to high gastric irritation, perhaps gastritis itself, and doubtless, also, he will find relief in leeches to the epigastrium, gum-water, cooling drinks, and laxative enemata. But these are not so much means of cure as for putting the system in a proper state to be cured by bark, or sulphate of quinia. Of these preparatory and auxiliary means, calomel, or, that which I prefer, blue pill, in a dose of five grains taken at bed-time, so as, either alone or with the aid of a few grains of rhubarb in the morning, to act on the bowels as a mild laxative, is worthy of commendation. This may be repeated every night for three or four nights, and constitute, for this period, the only medicine; or, if the case be urgent, we can give, with a much better prospect of its displaying its antiperiodic properties, sulphate of quinia in the morning or early part of the day after.

Another extreme of opinion is that on which I have already animadverted, and which consists in treating intermittent fever, as but a modification of remittent and of bilious fever, and as such, after equalizing morbid excitement, or placing the system "at par," by venesection and purgatives, to let the cook administer the tonics procured from the butcher, and the poulterer, and the baker, and disregard all others. Failure and disaster will attend the course of this advocate for unity, as they did that of the other who relied on bark alone.

But there is a period in intermittent fever, or rather there is a class of subjects labouring under this disease in its own appropriate regions, who will be signally benefited by nutritive tonics. They are the sallow, the emaciated,—except where the spleen is protuberant,—the ill-fed, having lived on crude fruits, and drank bad water; and, in fine, they who have become, among the men, anæmic,—among the women, chlorotic. These are the subjects on whom iron works wonders, increasing the red particles in their blood, and giving them colour, animation, and new life. By the influence exerted, also, secondarily through the blood on the nervous system, the latter acquires such tone as to be able to resist the operation of the atmospheric and the other unhealthy influences, such as of bad food and bad water. By chalybeates the disease may be prevented from making its attacks in those hitherto exempt; and by these same means it may be suspended in those suffering under its inflictions, and even in some cases entirely cured. As a general rule, however, we can only so far rely on iron as an indirect, but yet, under the circumstances now sketched, a very important curative agent, by its improving the quality of the blood, diminishing, and, to a certain extent, removing congestion, and giving to the nervous system, by richer blood, a better nutriment to its healthy sensibility, which is indispensable for the discharge of its functions.

I have alluded to cold bathing in intermittent fever; but as a remedy used both in the paroxysm and during the interval, it merits a more distinct notice. Occasionally we hear of practitioners relying exclusively on the cold bath for the cure of intermittents. A knowledge of the directly sedative effects of

cold, and an observation of its power of reducing febrile action to the normal healthy standard, as in the hot stage of intermittent fever, will make us slow to direct it during the interval, when there is often little or no superfluous excitement, and the predisposition to chill is manifestly great. It is hardly wise to imitate a paroxysm of fever by subjecting an individual, whose nervous system is rather enfeebled than excited, to a cold bath. He is necessarily chilled; has some rigors; and in the most favourable state a subsequent glow and reaction. Nor does the disturbance end here; pains in the limbs and head and languor are often complained of by those who use the cold bath, when the system is not above the natural level of excitement. From these premises, not a little strengthened by experience, I should feel inclined to regard habitual cold bathing in the interval as a hazardous remedy, and rendered often mischievous by the prevalent errors regarding its *modus operandi*. Very different are its effects when used in the hot stage of intermittent, or in the more permanent capillary excitement of gastro-cerebral fever, usually denominated typhus. Then the morbid excitement of the sanguineo-nervous structures which enter into the composition of the membranes, and are chiefly instrumental in the secretions, including that of caloric, is abated and often entirely removed; the patient is rendered tranquil, and enjoys a pleasant slumber unbroken by the former irritations of heat and thirst. Just in proportion as the state of the patient during the interval approaches to that exhibited in the hot stage will cold bathing be useful, but not otherwise. Hence, if there be a continued dry heat of the skin, frequent pulse with thirst, and little or no appetite, we shall derive good effects from cold affusion in the period between the paroxysms. This remedy is not, therefore, as often taught, akin to bark; the two stand opposed to each other in their effects, and their use is only properly called for under different and opposite circumstances: the one to allay morbid irritation and inflammation; the other to excite and strengthen parts already feeble.

LECTURE XCIX.

DR. BELL.

INTERMITTENT FEVER.—Treatment of the cold stage; in general simple—Venesection sometimes used—Origin in the medulla spinalis of pain in the back and limbs in this fever—Leeching and cupping the spine, and irritants to the same part—Confidence in quinia—Time for using and doses of quinia.—CONGESTIVE FEVER—Its true nature — Congestion when occurring—Cases—Identity of our congestive fever with malignant or pernicious intermittents of Europe—Writers who describe congestive fever—Bailly and Maillot's experience very valuable—Division of pernicious intermittents.

I SHALL begin this lecture with some observations on the appropriate time for having recourse to the chief remedies for the prevention and cure of intermittent fever; but without any formal division into those adapted to the paroxysm and those proper in the interval.

In common intermittents we ought not to weary the patient with the administration of drugs during the cold stage, but content ourselves with allowing him simple warm drinks, such as herb teas, and clothing to the extent he craves. If he feels nausea and a desire to vomit as the chill is subsiding and about to yield to the hot stage, he may drink some warm water, or salt and water, or a little warm camomile tea, to encourage vomiting and relieve the stomach. This operation is the more proper if food have been taken not long before, and is probably yet indigested. There are cases, however, in which the congestion in the cold stage is so great as to require immediate abatement, in order to prevent the organs from being fatally oppressed by the accumulation of blood in them. Strong stimulants have been sometimes administered with this view, but erroneously as regards doctrine, and injuriously as regards the patient. The remedy which has of late years obtained the most favour is of an entirely opposite kind — I refer now to venesection. Dr. Rush had recommended it, and I know it was tried by some of his pupils; but the late Dr. Mackintosh was the first to acquire for it general interest among the profession. On this point I shall make use of the language of Dr. Stokes.

"I shall now (says Dr. S.) make a few observations on the last subject connected with the treatment of intermittent fever, and this is the proposition of bleeding in the cold stage, put forward so ably by my distinguished friend Dr. Mackintosh, of Edinburgh. In the writings of almost all the older authors it was laid down, as an undoubted fact, that the cold stage of ague was essentially a stage of debility; they saw that the cold stage of intermittent fever was attended with considerable prostration of the powers of life; they regarded it as one of pure debility, and they completely overlooked its effects on the viscera. From an accurate observation of the phenomena of the cold fit, from perceiving that the signs of a retreat of blood from the surface to internal parts were evident, from ascertaining by dissection that the viscera were overloaded with blood, and from recollecting that in chronic cases of ague visceral disease was of constant occurrence and often the cause of death — from all these circumstances, Dr. Mackintosh was led to conclude that the old idea respecting the cold fit was a mistaken one, and that much good might be done by bleeding in the cold stage, so as to relieve the congestion of internal organs. This idea he entertained for some time without venturing to put it in practice, so strong were the existing prejudices against any kind of depletion in what was looked upon as a distinct example of debility; he ultimately, however, determined to make trial of it, and, with the self-devotion which characterizes true science, first put it in practice on himself. On being attacked with intermittent fever, he boldly rejected the venerated dogmas of the school, and had himself blooded in the cold fit. The operation was performed; and so far from any of the dreaded results occurring, it was followed by great relief. Since that time the remedy has been extensively tried, and he has given

an interesting and detailed account of it in his admirable work on the practice of physic."

My own experience of bloodletting in the cold stage of fever is limited. In two cases in which I adopted this practice, the result was not of such a favourable nature. One was evidently benefited; but neither in this nor the other was I dispensed from the necessity of subsequently bleeding them in the interval, before the disease was arrested.

To these I ought to add a third, which from its rare occurrence and the formidable nature of the symptoms, merits a more particular notice. It was of a young mulatto man, who had been confined to his bed for three weeks by gastric remittent fever. The paroxysms came on at irregular intervals, and were always marked by a frequent and rather full pulse, acrid heat of the skin, especially over the abdomen, and a burning thirst. Frequent bleedings from the arm and cuppings over the abdomen had been practised; purgatives of a saline and mercurial character were occasionally administered, which gave some relief at the moment, but always left the stomach and abdomen more tender to pressure, and the skin hotter to the touch. During nearly the whole time the tongue was loaded in the middle with a whitish-yellow coat, while its borders and tip were red and shining. After the expiration of the above period convalescence seemed about to be established; the pulse was nearer a natural standard, thirst less urgent, and temperature of the skin, except over the epigastrium, of an ordinary nature. Pressure on the abdomen rendered the pulsation of the aorta very perceptible. The patient gained very little strength, although he was allowed light animal broth and farinaceous food. At my visit in the afternoon (of September 17th, 1828), I found him in a state of great apathy, with an inclination to doze. The pulse was not materially altered, nor was there any other new symptom. A blister was directed to the back of the neck, and a laxative of rhubarb and magnesia at bedtime. At 11 o'clock, P.M., I was sent for in great haste, and on my arrival found the patient in a state of complete coma, utterly insensible to all objects of sight, sound, and touch; his limbs at first extended, remained in whatever position they were placed; the pulse was barely perceptible, and the breathing very slow. It was impossible to make him swallow anything, or to elicit from him the slightest evidence of consciousness. On applying my hand to the epigastrium, I could feel the abdominal aorta beat with considerable force; so did also the carotids. The contractions of the heart were frequent and laborious. The blister had been put on, but no medicine taken. Sixty leeches were now applied over the epigastrium, and sinapisms to the extremities. After the leeches had begun to fill, the pulse lost somewhat of its extreme tenuity, and by the time they were detached, it had regained its natural volume, was soft and easily compressible. The patient at this time began to move his eyes and the muscles of his mouth and face; he turned a little towards one side, yawned and stretched himself. The extremities were still cold and unaffected

by the sinapisms. Before all the leeches were removed, the skin became moist in places; and finally a sweat covered the face, trunk, and limbs, with the exception of the hands and feet. Enemata of tepid water were administered at different times through the night. In the morning, though languid, he was partially sitting up in bed, by leaning on his elbow, helping himself to some light nutriment. In the afternoon of this day he experienced some rigors, which disappeared in the evening in moisture on the skin.

On the evening of the following day, 19th, by eight o'clock, he was in nearly the same state as on the 17th, being completely comatose. Cups in large numbers were now applied to the temples, and over the abdomen, so as to detract about ten ounces of blood. The effect was salutary, and the recovery even more prompt than from the first attack. Enemata of cold water were given on the present occasion.

An examination of the symptoms of the case on the morning of the 20th, as presented by the pulse and skin, seemed to justify the use of the quinia, from which the furred and chapped tongue on the preceding days had deterred me. A minute inspection of this organ now showed me that under this dry and cracked coat it was pale, and rather thicker than natural. This appearance was readily recognizable by looking at the tip and sides of the tongue. A solution of the sulphate of quinia in water, ten grains to the ounce of fluid, was directed. Of this a tea-spoonful was taken every hour until the afternoon. There was then a very slight exacerbation. The medicine was resumed on the following day, and continued for several days. The patient was thenceforward clear of paroxysmal attacks, and gradually and regularly regained his strength and health.

Here was an extreme case, in which the coma, evidently a substitute for the cold stage of intermittent fever, was, apparently at least, relieved on both occasions by a free abstraction of blood. The subsequent reaction and distress were very inconsiderable, and did not, on either occasion, prevent the patient from sleeping quietly during the remainder of the night. Were I to meet with a similar case of congestive or malignant intermittent with that which I have just now detailed, I should give five grains of the sulphate of quinine at once, and repeat the dose every two hours until twenty grains had been taken.

Local bloodletting, which as yet I have merely alluded to, in connection with our present subject, will become a more conspicuous part of the treatment than heretofore, if we adopt the pathology of intermittent fever which supposes this disease to be a lesion of the nervous system, and more particularly of the cerebro-spinal axis; and that the sensation of cold and the pain or aching of the back and limbs result from a disorder of the spinal cord. Dr. Kremer, near Aix-la-Chapelle, has, within these few years past, pointed out a symptom in corroboration of this pathology, which will more directly indicate the propriety of local bloodletting. It is, a more

or less severe pain on pressure of the first dorsal vertebra, made from behind forwards with the fingers upon the spinous processes of the individual vertebra, and not upon several together. If intermittent fever is considerable, or old or masked, pressure on the first dorsal vertebra, by giving pain, will, as Dr. Kremer alleges, suffice to evince the existence of fever. The pain exists during the paroxysms, as well as in the apyretic interval, is stronger in epidemic than in sporadic intermittent fever, exists in all fever, and continues during the sequelæ (*Brit. and For. Med. Rev.*, vol. viii.). Corroborative of this view are the observations based on fifty cases by Dr. Grossheim, who does not, however, pretend to restrict the pain to one vertebra, as Dr. Kremer did. Dr. Grossheim found the pain to be most frequent in the middle of the dorsal portion, especially in quotidian intermittents. The extent of the pain also varies considerably; one or two vertebra only may be tender; and the pain rarely occupies the space of more than five or six; it may also be situated at distant parts with intervals in which none is excited by pressure. The pain was more severe during the paroxysms than in the intermissions. Do we not see a strong affinity between these pains, in their seat and character too, and those of dorso-intercostal neuralgia which I have so recently described to you? Dr. Grossheim was led to try the effect of reducing the local excitement or irritation in the fever; and, accordingly, in five cases, he applied eight or ten (German) leeches over the spine in the situation in which pressure gave most pain. In four of these this application sufficed without any other remedy being used to prevent a return of the paroxysm. I shall make the application both of the pathology and the practice deduced from it, which I have now briefly noticed, when I speak of congestive fever, to a proper view of which the remarks already made in this lecture are intended as an introduction.

Confirmatory of the views of the German writers, is a case which I find recorded in the *Amer. Jour. of Med. Sciences*, vol. xvii., by Dr. Malone of Florida, and which is the more valuable because it occurred at a date (1834) anterior, by some years, to the published statements in Europe. Dr. Malone, in his *Remarks on Spinal Irritation*, gives the following particulars respecting the second of the two cases which are the subject of his paper. It was of a lady of a sanguine temperament, aged thirty-five, who had just recovered from an attack of bilious remittent fever after a sickness of two weeks' duration. When visited by Dr. Malone, she had chills every day, with complaint of pain in the back, and general aching sensations all over. Believing that the disease was kept up by spinal irritation secondarily developed, he made an examination, and found the *lower part of the neck and upper half of the dorsal column tender in several places.* Just before the coming on of the chill Dr. Malone applied a large mustard cataplasm between her shoulders, and continued the camomile infusion, which he had before prescribed in moderate doses. The result was the preven-

tion of the chill. She applied the cataplasm once afterwards, and had no more chills. Dr. M. adds, that the applications of mustard cataplasms to the spine is quite a common thing in the country (Florida). He deduces a conclusion from the above case and analogous facts, that intermittents are frequently continued, if not actually produced, by spinal irritation.

Whether we believe that the phenomena of pain in the back and limbs and rigors proceed from a disorder of the spinal marrow itself, or of the spinal nerves, and probably the ganglions of the sympathetic, contiguous to and connected with them, we shall find indications for topical remedies to the spinal region. Of these, leeches or cups might be first used, and afterwards, if necessary, counter-irritants by mustard, vesicatories, &c. The latter order of irritants will be more beneficial in this way in warding off an attack of fever than when either applied to the abdomen or the extremities. I have had five vesicated surfaces on me at once, but without their preventing the recurrence of a paroxysm of intermittent, from which I was suffering at the time in Canton.

In justification of my confidence in bark, or sulphate of quinia, I may be allowed to adduce the following statement: — At first in Virginia, then in Canton (China), and subsequently during a term of twelve years as one of the physicians to the Philadelphia Dispensary, during part of which time the cases of intermittent fever were very numerous, I have had charge altogether of fully three hundred patients with this disease. I state this fact for the purpose of mentioning another, and of leaving you to draw from it the practical inference which it is my design to inculcate respecting the little necessity for hunting after new tonics or new combinations of tonics, if we place the stomach and viscera generally in a state fit to receive the quinia. Of these three hundred cases I do not think that I have used either vegetable bitters and astringents or arsenic in place of bark or quinia in ten cases; and I do not remember to have experienced any great difficulty in curing my patients in every instance except two. I do not say that there were not relapses after they passed out of my hands: but of this I had no knowledge.

Frequently, it is true, cases of a protracted nature came under my care, in which bark had been used with freedom, yet the fever either persisted in its regular course, or assumed a hybrid character of intermittent and remittent with gastro-hepatic, sometimes broncho-pulmonary irritation and engorgement. In such cases I found no difficulty of acquiring a control over the disease by the use of the lancet — or sometimes of cups to the chest, or over the abdomen, according as the lungs, or stomach, and liver, were implicated, — and the use of the blue pill in the manner already recommended. Occasionally a mercurial purge would follow the bloodletting, and in general a restricted regimen was enforced. After a treatment of this nature, which of itself sometimes mitigated the violence and even prevented the recurrence of the paroxysm, the bark, or its

equivalent, salt of quinia, was had recourse to with the effect of permanently curing the fever.

As respects the dose of the bark, we had not some years ago the choice which we now have. Bulky and unpleasant to the taste as it is, the patient could seldom be persuaded to take more than a drachm or two at a time, and even then it was not without difficulty that it could be retained by stomachs, rendered often irritable by the disease itself. If decoctions or infusions were substituted, still the same objection to a certain extent applied, and, at any rate, they seldom furnished an adequate quantity of the active principles of the bark. Tinctures, simple and compound, made more drunkards than cures of intermittent fever. Against adulteration of the bark itself it was hard also to be protected. Great, then, ought to be our gratitude to Messrs. Pelletier and Caventou, for placing at our disposal the alkaloids of bark and their salts, which possess a uniform strength, are readily soluble in different menstrua, and prepared in different ways, and which allow of so many adjuvants of a more or less agreeable nature being used with them.

Difference of opinion still prevails respecting the time at which the antiperiodic should be given, as well as the dose. Guided alike by physiology and therapeutical experience, we should, it seems to me, direct a full dose, adequate to impress strongly and diffusively the nervous system, and establish a new action in it, before the approach even of the morbid change which constitutes the paroxysm. Some time must elapse for preparation for the morbid process — and some time ought to be allowed for the remedial one to be set up. You had better then, so soon as the paroxysm of mixed cases is well over, by the subsidence of the hot stage into sweat, give five grains of the sulphate of quinia, and repeat it every four hours until four doses, or twenty grains, have been taken before the expected return of the next paroxysm. Opium or laudanum, according as you prescribe the sulphate of quinia, in pill or in solution, may be combined with it, if the symptoms seem to require it.

Congestive Fever. — Is it a better pathology or a change in the character of the disease which has caused so generally of late years the substitution of *congestive* for bilious remittent fever by our physicians in the south and west? Both causes have probably operated in bringing about the change of nomenclature; — although as yet there is not, I fear, a due appreciation either of the circumstances under which congestive fever has become more common, or of the real nature of the precursory and distinctive symptoms of the disease. The vast extent of new country in the United States which has been occupied, of late years, with a view to agricultural improvement includes regions, the localities and climate of which furnish the atmospherical or remote causes, whilst the labour and personal exposure of the new tenants of the soil are so many direct and exciting ones of fever, the dominant type of which is designated by the term congestive. It will be my endeavour to show you that this much dreaded fever is an aggravation of intermittent fever,

that it is identical with the pernicious or malignant intermittents of European writers; and that, when it is associated with our remittent fever, its principal features are the same.

There is not, properly, any fever characterized by congestion in contrast with another which is without it. Congestion, simply an accumulation and temporary retention of fluids and chiefly blood in an organ, is often no disease at all; it occurs in the uterus prior to menstruation and during pregnancy, and in the mammæ prior to lactation, and, also, in the muscles and lungs, liver and spleen, during very active exercise, and probably in the brain during sleep.

Congestion of a morbid kind is common in nearly all fevers, intermittent, remittent, and continued: it will accompany winter epidemics, in which the thoracic organs are the chief sufferers, and summer and autumnal ones, in which the greatest lesions are in the abdominal viscera and brain: it is not limited to any organ, — sometimes being most manifest in the brain, sometimes in the lungs, and often in the liver and spleen, or even kidneys. Congestion may be created by an afflux of fluids to a part in consequence of a simple increase of sensibility; as in the skin after high heat, friction, or insolation, in the mucous membranes after nervous stimulants, &c. Strong innervation, in which the nervous centres are much excited, as under various emotions, will produce congestion at one time of the brain, at another of the lungs or liver. Certain nervous affections, as hysteria, will give rise to irregular determination and retardation of blood; in fact, congestion of an organ, which, like that of a physiological kind, often entirely disappears after the removal of the nervous disturbance. Under nervous derangement of this kind we sometimes meet with the phenomena of coma, catalepsy, somnambulism, paralysis, tetanus, and convulsions, and other diseases of animal life, and icy coldness or excessive heat, fulness and throbbing, dyspnœa, vomiting, hiccup, colic, hemorrhages, tympanites, ischuria, diarrhœa, &c., among the derangements of organic life. With many of these nervous affections congestion is associated; sometimes preceding, sometimes remaining after the disappearance of the more obvious and violent symptoms.

Congestion may precede or follow inflammation, but without acknowledging this latter as its cause. It may also be accompanied with a retention of muscular strength, or with extreme debility and prostration. I was much impressed with an evidence of the former combination in the case of a large muscular Scotchman, a deserter from the British fleet during the last war, who found his way to Winchester, Va., and was there seized with the epidemic which went by so many names — the chief of which were typhus pleurisy and typhus pneumonia. This man, whom I saw about ten o'clock in the morning after the earlier visit and prescription of my preceptor, could not be kept in bed; he paced up and down the room with a firm step, making every now and then allusions to his recent escape, and without any fear about his recovery. His voice was

husky, and breathing somewhat laboured; pulse of some volume, but easily compressed; face deeply suffused, eyes watery. At my next visit, in less than two hours afterwards, the patient was a corpse. The differences in the degree of muscular strength or in the activity of the circulation are seldom dependent on or explicable by the extent of the congestion; but rather on that of the prior and accompanying impression made on the nervous system. In the case just referred to, the congestion of the lungs was not accompanied by any notable sedative action on the nervous system — whereas, at the onset of certain fevers, this system which, had been commonly for some time before exposed to a slow but deleterious sedation, is now in a temporary palsy, and hence the languor and inability to move. Duration of the congestion will give a tolerable measure of its character, that is, of its dependence on simple nervous excitement, or on inflammation. If it depends merely on nervous disorder, it is irregular in its appearance, and commonly, indeed distinctly, periodical; as we see in all the disturbances of the circulation and accumulations in particular organs. But if the congestion be permanent, or if it have supervened on a permanent disorder of function, we may infer that it depends on an abiding cause, which is inflammation. These two kinds of congestion are often manifested, the first in the inception, and the second in the latter stage of fever. The drowsiness, the obtuseness of senses and bewilderment of intellect, are evidences of congested brain at the beginning of the fever; but, being simply the result of nervous depression, they soon disappear with the reaction. Similar disturbances of function at the conclusion of the disease are more generally brought on by the congestion, which is renewed and maintained by meningitis or encephalitis.

Congestion is commonly associated in the minds, I believe, of most physicians with symptoms of want of action at the surface of the body and extremities, and by a kind of collapse of the capillaries. Cholera, dysentery, and some other abdominal diseases, afford examples of this kind, as do some of the diseases of the lungs, in the winter season, which occur in the old and intemperate, who may have been long exposed to the inclemency of the weather. But there are other forms of congestion, as of that of the brain and lungs from sun-stroke, in which the external heat and morbid action of the capillaries are excessive. In pulmonary congestion, especially that which was so common in the winter epidemic already referred to, I was struck with the not unfrequent occurrence of a profuse watery and warm sweat in the very last and fatal stage of the disease. The boatswain who walked about his room until almost at the point of death had, I well remember, these symptoms. I was called early in the morning, some years ago, to visit a man, whom I found in all the horrors of cerebral congestion and convulsions, which were ended in an hour afterwards by death. He had retired to rest the preceding night after a supper of mush and milk, and having used a pediluvium of cold water. Early in the morning he awoke some persons in the room beneath him by delirious efforts,

as if he wished to bail out a boat. He had been a fisherman and of intemperate habits, much exposed to the sun during the preceding week, and on two different occasions had suffered from a sun-stroke. On dissection, the arachnoid was found to be thickened and covered with fluid, which also filled the ventricles; the pia mater was injected in patches, and its larger vessels turgid. The mucous membrane of the stomach and small intestines were deeply injected in different parts, and the liver was much engorged. Here is an instance of congestion of the brain supervening on prior inflammation of the arachnoid; and that of the liver, though this is less certain, following that of the gastro-enteric mucous membrane. But the point to which I wish more immediately to direct your attention is the high and diffused heat of the surface in this case, which remained many hours after death. I have seen, I think in the same summer, a person perish in nearly a similar manner from cerebral and pulmonary congestion, whose skin just before death was intensely hot, especially over the chest and abdomen. In the persons suffering from sun-stroke, a common accompaniment of the mortal symptoms, and which I have noted at different times, is this acrid heat of the skin, which repeated cold affusion will sometimes hardly abate. Here, together with abdominal and cerebral congestion, there is an atony of the capillaries; not that of collapse, but that succeeding to inordinate excitement, caused by the sustained stimulus of high heat to the skin and lungs.

The physiological state of congestion is simply repletion in excess of the vessels, which may amount to plethora, and distention of the tissues of the part affected. Consequently, as you must by this time have inferred, it may exist without any organic lesion or deviation of parts from their normal state; although at the same time it may so interfere with a function as to obliterate it, and even cause death. Thus, apoplexy is sometimes the consequence of mere cerebral congestion, without any rupture of vessels or effusion of fluid beyond its proper limits. In the lungs, nearly a similar state of the vascular system is occasionally met with, constituting pulmonary apoplexy, which will of itself kill without any notable alteration, by laceration or otherwise, of the pulmonary tissue or vessels. We discover not unfrequently proofs of the truth of this position in an entire disappearance of all the evidences, as they would be termed, of congestion just before death. The accumulated blood has passed from the smaller arteries into the veins, leaving no sign of organic lesion. There is, for the same reason, no morbid product of congestion, if we except sometimes a sanguineous or serous exhalation, which does not, however, alter the intimate texture, or transparency even, of the tissues. This coincidence of hemorrhage and serous effusion with congestion, has induced some to believe, but erroneously, that the former morbid phenomena are necessary consequences of the latter state; the more so, because the congestion is often relieved by the discharge of blood or serum, as the case may be. But there may be hemorrhage without conges-

tion, or, still more frequently, there is congestion without hemorrhage. This remark will apply to the coincidences between congestion or local plethora in the liver, spleen, or stomach, and vomiting and increased biliary discharge and other disturbances of secretion. The mere accumulation of blood, or the material for secretion, in the liver or the mesenteric circle, or in the kidneys, will not necessarily cause a greater secretion of bile, or of sero-mucous discharge from the intestines, or of urine, unless there have been an augmentation of nervous excitement in these organs, either by increase of general innervation, or by a new stimulus acting directly on the secreting surface of the organ, or of a surface with which, as in the case of the liver, it is in functional relation. How often do we not find the lungs dammed up with blood, but without any increase of pulmonary exhalation or of mucous secretion, and the liver gorged with blood, hardly giving out bile at all.

The congestive fever of this country, and especially that of the western and southern states, is identical with the malignant or pernicious remittents, or the intermittent ataxic fever of the writers of continental Europe, and has been more particularly described by those of Italy. In the great valley of the Po, in the hospitals of Milan, Pavia, Padua, Vicenza, and Venice, and in the adjoining country; also in the marshes from Pisa and Sienna to the sea, and in the *Campagna di Roma* and Pontine Marshes, numerous cases are met with yearly of malignant intermittent and remittent fevers, such as were long ago so accurately described by Torti, Ramazzini, Riverus, Lancisi, in former times, and Rubini, Giannini, Folchi, Bailly, and others, in our own day. Morton and Cleghorn, the latter deriving his experience from observations in Minorca, have contributed valuable information to the same purport, which has been amplified and extended by Lind, Pringle, Clark, Jackson, Johnson, and numerous writers in medical journals. The list might be extended, but I refer to those now before me. I cannot, however, allow to pass, without special notice and commendation, the excellent work of Senac on Fever, translated by Dr. Caldwell, from the perusal of which, early in my medical studies, I derived so much profit, and also the more ambitious but yet useful Alibert in his treatise on Pernicious Fevers.

The suddenness of the attack, the extreme prostration and utter insensibility, in fact complete coma, the restoration to comparative health, and, return, if possible, with aggravated symptoms, are some striking features of these malignant intermittent or congestive fevers. I have seen, when at Whampoa below Canton, a sailor fall down on the deck within a few feet of me senseless and motionless, as if apoplectic; it was the first paroxysm of an intermittent fever, the second of which I prevented by the liberal and timely administration of bark. On board of another vessel I was requested to visit incidentally a man, the steward, supposed to be under the influence of poison; he was in a state of insensibility, comatose, with occasional slight convulsions, and unable to swallow. He had been in this state since the preceding evening. It was then ten o'clock in the

morning. External stimulants and an enemata of turpentine had no effect. He died before noon.

There are other cases, again, of these congestive and masked intermittents, in which the reaction is slight and the remission hardly observable before another paroxysm of coma and its accompaniments return, and carries off the patient. The dominant symptom is sometimes excessive coldness, as in the algid intermittent, sometimes extreme and uninterrupted sweating, at others syncope, and again delirium. Occasionally, the part which most suffers is the pleura, or the lungs, and the pain of which recurs at regular intervals. Cases have been seen in which the periodical return of the paroxysm was marked by epilepsy or convulsions, or by acute and distracting headache. The type of the worst cases is double tertian — sometimes a mortal paroxysm with congestion would supervene on remittent fever. I have already mentioned the case of comatose tertian, when treating of intermittent fever, which occurred in my own practice in this city. Pinel relates the case of a comatose intermittent which was stopped by bark in an ounce dose, but in twelve days afterwards the disease showed itself in the form of a sweating fever, which was cured by the same remedy.

Senac gives an account of an epidemic remittent fever, which, if reproduced in one of our medical journals under the name of another author, would be readily received as highly descriptive of congestive fever in Illinois, or in Mississippi: — Cleghorn, after describing the paroxysm of a true simple or double intermittent tertian, tells us of an aggravated and complicated disease in which, among other bad symptoms, there were cholera morbus, sopors, apoplectic fits, bleeding at the nose, &c. Lind gives two cases which will illustrate two of the varieties of intermittent described by Torti —viz., the *comatose*, which Cleghorn says are common in Minorca, and the *cardiac*. Congestion coming on in the progress of a remittent fever and proving fatal is a matter of frequent occurrence. Clark (*Observations on the Diseases which prevail on Long Voyages to Hot Countries, &c.*) gives one in point. This writer relates another case which, by mismanagement, was converted into a fever, in which the remissions were imperfect, and there ensued severe quotidian exacerbations and congestion.

In the endemic fever of Bengal, sometimes without any previous indisposition, the patients fall down in a deliquium, during which the countenance is very pale and gloomy: as they begin to recover from the fit, they express the pain they suffer by applying the hand to the stomach and head, and after vomiting a considerable quantity of bile they soon return to their senses. Sometimes the attack is so sudden and attended with such excruciating pain at the stomach, that I was obliged, says Dr. Clark, from whom this description is taken, to give an opiate immediately. Dr. Johnson states that in the bodies of those who died of this fever the liver was so engorged that it actually fell to pieces in handling. The gall-bladder contained a small quantity of bile, in colour and consistence resembling

tar, and the *ductus communis* was so thickened in its coats and contracted in its diameter that a probe could scarcely be passed in it. Much incipient inflammation was visible in some parts of the small intestines, and the internal surface of the stomach exhibited similar appearances. No sign of actual inflammation was seen in the cranium.

The endemic fever of Batavia is, also, highly congestive. Surgeon Shields has contributed a good account of it in Dr. Johnson's work on the *Diseases of Tropical Climates*. The patient on the first attack frequently falls down and is insensible during the paroxysm, his body covered with cold clammy sweats, except at the pit of the stomach, which always feels hot to the palm of the hand; the pulse is small and quick. The length of the paroxysm varies from six to eighteen hours, and it was generally succeeded by cold rigors, very often low delirium, preparatory to the next stage or paroxysm of the fever. The intellectual functions now become impaired, the patient not being at all sensible of his situation or of any particular ailment. If the patient be asked how he is, he commonly answers, "Very well," and seems surprised at the question. This is a very dangerous symptom, few recovering in whom it appeared. A great proportion changed in a few days to a bright yellow, some to a leaden colour; other cases terminated fatally, in a very rapid manner, too, without the slightest alteration in that respect. Generally, however, the change of colour indicated great danger. Vomiting of black bilious stuff, as Mr. Shields expresses it, like grounds of coffee, frequently commenced early and continued a most distressing symptom, too often baffling all attempts to relieve it. In some a purging of vitiated bile or matter, resembling that which was vomited, occurred; in a great many a torpor prevailed throughout the intestinal canal; rarely did any natural fæces appear spontaneously.

The most instructive writer on the subject, for many years past, is Doctor Bailly of Blois, who visited Rome and passed some time there (1820, 1821, and 1822,) for the express purpose of seeing the congestive or malignant intermittents so commonly met with every year in the hospitals of that city. M. Bailly has given to the world his experience on this interesting topic, in a work entitled *Traité Anatomico-Pathologique des Fievres Intermittentes, Simples et Pernicieuses*, &c.: Paris, 1825. To the inquiring pathologist, who ought to be something more than a mere morbid anatomist, the *post mortem* appearances of some of those who died from this fever will be interesting. These show, however, that which has been demonstrated at other times, that we cannot designate a fever by a distinctly ascertained anatomical character of the lesions which may occur in its course, although we often are called upon to note the organic changes which accompany and complicate it.

Doctor Bailly gives an account, some of them in detail, of upwards of sixty cases of pernicious or malignant intermittent fever, which he classes in this manner: — 1. Those fevers, the predominant symptom of which was furnished by the head; and are called

comatose, delirious, and convulsive. 2. Those whose chief symptom is abdominal disorder, — epigastralgic and gastric fevers, &c., rupture and softening of the spleen, and putrilaginous softening of the liver. But we are not to suppose that dissection showed in the cases of either class a lesion solely of the organ chiefly affected. The very first observation recorded by M. Bailly of a case, which he designates as a comatose, convulsive, pernicious intermittent fever, showed after death *arachnitis*, *cephalitis*, and *gastro-enteritis*. The patient who was thirty years of age and of a strong constitution had laboured for some time under a tertian fever. He entered the hospital on the 2d of July, 1822; on the 3d he had a slight paroxysm of fever, after which he took two ounces of bark. On the 4th at noon he was walking about in the ward, felt very well, and was joking with the other patients. All at once he was seized with a violent chill, which was succeeded by a high fever, during which there was contraction and inflexion of the fore-arm on the arm and a profound coma; he died six hours from the accession of the fit.

More recently the subject of pernicious intermittents or congestive fevers has been discussed in a very excellent, because practical and observing spirit, by Dr. Maillot, who was for some time attached to the French army in Africa. He believes himself to be justified in regarding intermittent fever as intermittent cerebro-spinal irritation; a view expressed in different terms, but identical with that which I advocated both in my last and in the present lecture. The bad or pernicious intermittent he regards also in the light with that which I have for some years past inculcated, viz., as a complication with the nervous irritation of a lesion of the brain, or of the abdominal or thoracic viscera. The following summary of his division of these bad kind of fevers will add to your knowledge of the subject; I draw it from the *Brit. and For. Med. Rev.*, vol. viii.

Of the forms referrible to lesion of the cerebro-spinal apparatus, M. Maillot describes three, which are the most important: the comatose, the delirious, and the algide, or that icy-cold form for which we have no admitted English appellation.

In the *comatose* form, the stupor may vary in degree from simple oppression to profound carus. The pulse is full, large, without hardness, sometimes quickened, occasionally retarded: the respiration is slow, noisy, stertorous. The patient lies supine, and his limbs appear paralyzed; the jaw is firmly closed, and deglutition is difficult; sometimes there are epileptic spasms. These severe symptoms commonly occur with the second paroxysm, nothing taking place before to give warning of them, except it be some slowness of speech in the apyrexia. After an uncertain continuance of the comatose stage, the sweating stage follows, and the patient slowly recovers, wearing an extraordinary air of astonishment, and seeming to recover his senses one by one. Very full information concerning fevers of this kind is to be found in the excellent work of M. Bailly of Blois, published in 1825, and founded on observa-

tions chiefly made at the hospital of Saint Esprit at Rome, in 1820, 1821, and 1822, to which we cannot do better than refer the reader, who is particularly interested in the nature and treatment of these dangerous affections, rare, or almost unknown, in our climate, but highly destructive in many localities where British practitioners in the army and navy are called upon to contend with them.

The *delirious* form of pernicious intermittent is, like the comatose, very common. Its name indicates its chief peculiarity. Death often takes place suddenly, without the supervention of coma: "life is broken by a single shock." If a salutary crisis ensues, the skin becomes moist and perspirable, the pulse loses its hardness, and the delirium gradually subsides.

The *algide* form is very peculiar. It is not, M. Maillot observes, at least generally, an indefinite prolongation of the cold stage. In the first stage of an intermittent, the sense of cold experienced by the patient is out of all proportion to the actual reduction of temperature; whereas in the algide fever, although the skin is icy-cold, the patient does not complain of coldness. And this cold state supervenes after reaction has commenced, and often suddenly. The circulation becomes disturbed, lowered, and the pulse can scarcely be felt, the temperature of the body at the same time rapidly decreasing. The extremities, the face, the trunk, become cold in succession, the abdomen remaining longer warm. The skin has the coldness of marble. The tongue becomes pale, moist, and cold, the lips are without colour, and the breath is cold. There is no thirst, and attempts to drink often excite vomiting. The actions of the heart become feeble, and only appreciable by auscultation. The intellectual faculties are undisturbed, and there is a sense of repose which is agreeable to the patient. All facial expression is lost. With this state, cholera may become conjoined, and the eyes then become hollow, glassy, and surrounded by a bluish circle. The approach of the algide form is so insidious as often to be mistaken for a remission produced by bloodletting, and the practitioner is only undeceived by the suddenness of the death of the patient. This deceitful calm is very strongly pointed out by M. Bailly, in his chapter on Diagnosis: he says that the patient may be walking about a few instants before his last attack; the accession is sudden, he lies down, and dies in a few hours. Even when the pain (of the abdomen) and the danger are both considerable, the face has an appearance of calmness, as if its expression was no longer associated with the sufferings of other parts. Whenever, says M. Maillot, a sudden retardation of the pulse succeeds to reaction, and there is paleness of the tongue and discoloration of the lips, we should not hesitate to pronounce the case algide. Temporizing measures will be followed by death in a few hours. The patient dies as by an arrest of the innervation. If death does not take place, the pulse rises, the skin reacquires its natural warmth, and sometimes irritation of the brain or intestinal canal succeeds. Even this dangerous affection sometimes yields to remedial measures. The resemblance between this condition and cholera is

commented upon by M. Maillot; and as, when left to itself, the algide form of fever is perhaps as fatal as cholera, he is of opinion that death in the latter affection has been too exclusively attributed to the excessive fluid evacuations.

These are the most general forms of pernicious intermittent. But sometimes the fatal symptoms are localized in the abdomen, constituting the gastralgic, choleric, dysenteric, and other forms. The *gastralgic* form is signalized by the acute, burning, tearing pain of the stomach; and in this state the face is contracted, and expressive of the utmost anxiety: this form is, however, seldom fatal. The *choleric* form is attended with very violent symptoms, which follow the periods of the fever, according to the expression of Torti, as the shadow follows the body. The *dysenteric* form, M. Maillot remarks, cannot with propriety be classed as pernicious, as when it is fatal there is either chronic colitis, or the comatose, or delirious, or algide form of the disease has supervened. There are cases of intermittent fever in which jaundice takes place very suddenly, and disappears very slowly; this accident generally indicates a severe disease, to which the name of *icteric* fever has been applied.

To the forms in which sudden faintings occur during the attack, or palpitations, with pain at the heart and a feeble pulse, the names of *syncopal* and *carditic* have been given. When the lungs have been affected, the fever has been called *hemoptoic*, or *pleuritic*, or *pneumonic*, according to the complication.

Of all these forms of pernicious intermittent, M. Maillot gives examples; and he concludes, that pernicious fevers only differ from ordinary intermittents by the violence of the congestions. They are most frequent in the hot seasons, when the visceral irritations which accompany the attacks are both more numerous and more intense.

LECTURE C.

DR. BELL.

CONGESTIVE FEVER.—Congestion of an organ may disappear with the paroxysm; is often permanent and becomes inflammation—Nervous coma—Paramount part performed by the nervous system—Inflammation of an organ with the intermittent fever—Symptoms deduced from observation of the nervous system—Periodical inflammation—*Diagnosis*—Characteristics of our country fevers—Difficulty of ascertaining the presence of inflammation—Hour of the paroxysm—Morning paroxysms sometimes the most dangerous—Expression of the face—Decubitus—Chief symptoms—Appearance of the tongue; not to be relied on—Pulse varies very much—Temperature of the skin—Gastro-intestinal symptoms—Suspension of the secretions and excretions—Serous discharges—State of the urine; sediment in.—*Modifications of sensibility*—Pains of two kinds.—*Prognosis*, difficult—Death takes place in the period of reaction of the paroxysm—Danger estimated by violence of the paroxysm—Cleghorn's prognostics—Case—Different meanings of symptoms according to time—Duration, and natural or spontaneous termination.—*Post-mortem Appearances.*

ASTONISHMENT is often expressed that, after the violence of seizure of particular organs in successive paroxysms of the fever, no evi-

dence remains of a change in the relation or size of any of the parts of the organs to each other; as in the case, for instance, of apoplexy, or coma and lethargy, coming on with a paroxysm of the fever, and going off with it, and yet leaving no mark behind. But it is not always so; for careful observers, such as Dr. Bailly, point out almost uniformly the remains of some organic lesion; gastro-enteritis, or splenitis, or arachnitis, and often two or three of these combined. Still is the contradiction in this case more apparent than real. The series of symptoms of the fever now under consideration may be produced by simple irritation of the nervous system, which, in its reaction, gives rise to injection of tissues and accumulation and congestion of blood in the organs, and consequent derangement of function similar to those organic changes and the sympathetic disturbances and effects caused by inflammation. The brain, lungs, stomach, intestines, liver, and skin, are all in a state of temporary excitement by irradiation on their vessels, as the heart is from similarly augmented nervous power during the reaction of the paroxysm of intermittent fever. All these organs may, after a longer or shorter time, part with the excess of blood which they had, and lose at the same time their morbid susceptibility; in fine, be restored to their pristine state; thus illustrating the remark of Senac: "that there may be great disorder in the functions of the body without either real inflammation or any fixed disease in the solid parts." But whilst this explains the general reaction and febrile exacerbation, it is still inexplicable to many how an organ should have its functions so completely suspended, and in a manner which at other times is commonly if not necessarily fatal. A knowledge of the difference in predisposition of particular organs aids us in a solution of the difficulty. One organ is oppressed by a remora of blood in it which is hardly inconvenient to another. One person has the vessels of the brain habitually turgid, and the organ reduced to a state of indirect debility by severe and protracted intellectual labour. A change in the mode of innervation, such as occurs in the paroxysm of fever, is sufficient in this case to augment the vascular fulness in the meninges of the brain to an extent that brings on apoplexy. But as there is no rupture of vessel, nor lesion of the cerebral substance, the apoplectic seizure lasts no longer than the cause which produced it; and as this was but a congestion induced by the excitement of the nervous system, and temporary, its removal is followed by that of the apoplexy. A restoration of the vessels of the brain to their usual state, and of the nervous system to its medium excitement, suffice for the cure. But as no attack of this kind is quite harmless, the brain is less able to bear the same amount of pressure, and the vessels the same distention as before, and a renewal of the apoplectic paroxysm may be attended with much more serious consequences than before. The prevention of this event is brought about by acting on the nervous system, and indisposing it for the irritation and reaction which gave rise to the congestion. Bark or quinia, by prevent-

ing the return of the paroxysm, and altering the mode of innervation, has been said to cure the apoplexy: but, in fact, it has cured the morbid state of the nervous system, one of the symptoms of which was this apoplexy. A similar explanation is applicable to coma and lethargy, and arachnitis even, as well as other anomalous and alarming symptoms in congestive fever. Here, however, an important question occurs, whether the trouble in the nervous system itself, sufficiently great to simulate these maladies, may not be produced by impressions made on it, irrespective of phlogosis of its membranes and substance. Drowsiness and sleep are the consequence often, if not always, of transmitted impression from the nervous system of organic or nutritive life to the brain. But let the impression transcend the normal or physiological degree, as after excessive repletion, and the drowsiness will pass into a state of almost apoplectic stupor. The same result is obtained by the transmitted irritation of certain narcotics. In other cases again, indigestible matters of a cold nature, such as some of the *cucurbitaceæ* and *brassicæ*, produce a directly prostrating and really poisonous effect on the gastro-intestinal nervous expansion, which is transmitted to the brain, and is followed by insensibility, coldness of the surface, small and almost extinct pulse. A pathological state of the digestive system and of its auxiliary organs is every now and then met with, in which the sensations are of an obscure yet unpleasant nature, just short of pain; and the abdominal nervous system, the larger part of that of organic life, transmits this irritation to the brain, in which it gives rise to coma. The patient is easily roused, seems to notice what is said, but lapses immediately into an apathy and stupor, as if oppressed by the deleterious influences just described. The nervous system is at this time in a perverted state; one, in fact, of irritation. The remedy should be such as to act directly on it, either by a sedative influence, like that of opium, or by a modifying one compounded of sedation and tone, as that of quinia. In another form of the disease, there is no doubt that coma is caused by the pressure of congested, of the excessive irritation of inflamed meninges, and is associated with different states of the vascular system from that of the first or simply nervous kind. To be able to determine the difference between the two is a matter of difficulty. There is, indeed, much more difficulty in symptomatology than we should suppose in reading the formal and dogmatical description of diseases based upon their differential diagnosis. The nervous system is capable of being excited and depressed, and of having its functions variously modified and perverted, by simple irritation or sedation acting on its own tissue, and in parts remote from that on which the morbid action seems to be concentrated. When treating of neuralgia I had occasion to state, that the violent pains referred to a particular nerve or spot in a limb were at times really caused by a morbid change in some part of the central mass; and we know full well, that the violent temporary disturbances in the cerebral functions, as in epilepsy and hysteria, are often caused by

irritation of a remote nerve. Modifications and perturbations of the nervous system, including those which disturb, by depraving or abolishing the intellect and sentiments in fever, are, at times, undoubtedly the consequence of irritation of a phlogosed membrane; the gastro-enteric at a distance from, or the arachnoid in proximity to, the brain. There is nothing, therefore, specific or peculiar in inflammation which disturbs the nervous centres and their functional operations; nor is it essentially different, as an exciter, from those other material causes which act through the atmosphere, and by means of various ingesta and medicinal stimuli and sedatives.

It will be impossible for you either to obtain just notions of the circle of the phenomena which make up congestive fever, or to devise a proper curative course for its removal, unless you bear steadily in mind the paramount part which the nervous system performs. By its instrumentality the succession of paroxysm and of interval, constituting the disease one of intermission, are gone through: by the excitement of this system the various congestions are produced, and through it they are often removed. Frequently, all the alarming symptoms derived from the circulation, respiration, state of the animal heat, and from the secretions, are but effects of disturbance of the nervous system, a removal of which causes all the others to cease, and to cease all at once too, as if by enchantment. Inflammation may supervene to aggravate the fever, and confuse in a measure its type; but whether the former is cured or remains, the latter will still exhibit its characteristics. You may have a case of phthisis and of intermittent fever, as M. Bailly relates his having seen at Rome — you will cure the fever by bark or quinia, but the organic disease of the lungs persists as before. You may have to treat a case of dysentery, conjoined with intermittent fever, like that which Torti records; and like him, you may cure the latter by the customary febrifuge, and yet the dysentery will end fatally, and you will find ulcerations along the whole course of the colon.

Without a constant observation of the nervous system you cannot appreciate the true character of many of the symptoms — the sudden and early stupor, the disinclination and at times the complete inability to move. The feeling of sinking and the entire prostration of muscular power are not, as in most acute diseases, in any proportion to the extent and violence of the inflammation, or to the impediment to nutrition. A man who has been sick but a few days, and who still retains his fulness and muscular development, will find himself unable to rise from his bed or to stand up — such has been the strong and deteriorating impression made on the nervous system; an impression which lasts, too, sometimes after the periodicity of the fever is broken, and the morbid cause, whatever it may be, no longer acts. His appearance may indicate health, his pulse be full and slow, and yet for several days after the last paroxysm he lies, per force, on his back, powerless and nearly motionless. I have often been struck with the fact, and pointed it out at the time to some of my young friends who were present, of the torpor of faculties, the stupidity

and bewilderment of patients who had suffered for a while from only the common intermittent fever. No real or presumed state of an organ in which inflammation or vascular change of any kind has taken place, is adequate to account for this state of things. It is seen in and through the intervention of the nervous system alone, and on it should our attention be fixed, in order that we may obtain a correct diagnosis of its disorders in the case.

But, on the other hand, let us not exaggerate the importance of the manifestations of the nervous system, to the exclusion of a notice of the phenomena of the associated inflammation of some important organ. The periodicity of the attacks of fever, and the interval of comparative exemption from pain, heat, and other evidences of inflammation, have induced some to deny the existence of this latter state, and to allege that a periodical phlegmasia is impossible. I have already anticipated this objection, by showing that, no matter what may be the kind of irritant which calls the nervous system into morbid action, no matter whether it be ever present or applied at stated intervals, the disorder of this system and the accompanying phenomena will not be the less periodical. Inflammation does not prevent or destroy periodicity; nor does periodicity preclude inflammation, although it will often greatly modify it. In the last stage, or that of reaction in fever, the already inflamed and weakened vessels being now more injected than before will be less able to pass on their contained blood, and hence congestion; the minute capillaries are excited more, and hence new formations, or an increase of former ones, which is in fact an increase of the inflammation. So that, although we are ever so fully persuaded of the fact of an organ being inflamed in periodical congestive fever, we must not on this account be the less anxious to break the periodicity, and to prevent the return of a paroxysm which, in the manner just described, must necessarily increase the danger of the inflammation, both by an increase of the morbid sympathies and by the formation of new products. Here, again, there is danger of erroneous and hasty inference, by supposing that the remedies which prevent the recurrence of the paroxysm through their action on the nervous system are also remedies for the cure of inflammation. Quinia and opium will, by their operation in the first mentioned case, mitigate inflammation; but the organic lesion remains, and is not to be removed in this way. This remark is applicable not only to the coexistence of gastro-enteritis, but also of arachnitis, cephalitis, splenitis, and less rarely of peritonitis, pleurisy, and pericarditis, with intermittent or remittent fever. In a case of urgency, we should give quinia to prevent the recurrence of the febrile paroxysm which aggravates the inflammation, whilst at the same time we should bleed freely to subdue this latter and save the affected part from disorganization. Herein is a difference between the congestion which is brought on by the paroxysm and disappears with it, and which may be cured by the same remedy used to prevent the latter, and the inflamma-

tion which is mitigated but not cured by the prevention of the paroxysm.

Diagnosis. — These general, and, I hope, useful views of the relations which the nervous and the vascular systems bear to each other, and the manner in which the former is impressed by, and, in its turn, influences the congested and inflamed organs in fever, having been stated, I shall next proceed to make some remarks on the *diagnosis* and the value of symptoms in the disease. It will be readily believed that, as congestion is associated with such various forms of fever, the symptoms must vary greatly in a corresponding manner. In this part of our subject, an explanation of seeming anomalies must still be found in the extent to which the nervous system has been impressed, rather than in the degree or duration of phlogosis and congestion of the organs and functional tissues. We are safe in saying at the outset — 1, that nearly all the country fevers, especially those met with during the summer and autumnal months, are ushered in with chill and other evidences of a morbid state of the nervous system, which are followed by reaction, making up the febrile paroxysm; 2, that this morbid excitement is followed by a remission or partial subsidence, and sometimes an entire absence of the fever; 3, that after a longer or shorter period there is a recurrence or exacerbation of the disease, manifested by nearly similar symptoms and in the same order with those of the first attack, the recurrence commonly being of a double tertian type; 4, that the obscurity of the remission, or want of perfect intermission, is generally owing to the perturbation of the nervous system, caused by a congested or inflamed organ; 5, that the danger will be in proportion to the violence of the symptoms during the paroxysm, rather than to the appearance during the interval; 6, that the paroxysmal attack in intermittent and remittent congestive fever commonly takes place in the morning or early part of the day.

There is hardly any question so easy of solution as the recognition of most intermittent fevers, — but, adds Dr. Bailly, who makes this remark, there is nothing more difficult than to make out a case in which the intermission is marked by symptoms indicating an acute inflammation which had existed anteriorly to the fever, and may still persist with it. Believing that we have still to deal with the same disease, inflammation, we are apt to regard each exacerbation as the signal for a repetition of the active antiphlogistic measures employed at the beginning.

The hour at which the paroxysm first comes on, and that of subsequent exacerbations, will influence us in forming our opinion as to the probable kind and origin of the fever. If the attack is in the morning, accompanied, as it may be, by delirium and convulsions, or stupor and coma, we shall refer it to congestive fever of a periodical type, and attach less danger to it than we would to a similar febrile attack in the evening, as in this latter case we may fear the symptoms depend more on fixed inflammation. But we are not to infer

that a paroxysm in the morning implies safety — since, in the great majority of the cases recorded by Dr. Bailly, this was the time in which it came on. The worst cases of what is commonly called bilious remittent fever, but which were in fact congestive, that I ever saw, had their paroxysm ushered in very early in the morning, sometimes before daylight. When, therefore, you are aroused from your beds by an urgent call to visit a case of remittent fever at this hour, or are told by the nurse or friends in attendance that your patient has had a violent fit at this time, you must shape your measures so as to prevent its return the next morning. Certain it is you will not be allowed the same time for treatment under such circumstances as you might be if the exacerbation were to occur at least at noon, or in the afternoon.

The general *expression* of the patient in congestive fever less distinctively indicates the internal trouble than in continued or common inflammatory remittent fever. A certain fulness of feature and limb in the former contrasts with the contracted and pinched features in the latter; or when we compare common gastro-enteritis with that associated with congestive intermittent fever. The sudden transition from the agonies almost of death to ease and comparative health, is another characteristic of the fever in question: but this transition, although pleasurable to the patient, must not mislead the physician, and make him blind to the probability of a renewal, on the next or the second day, of the worst symptoms, and, perhaps, a fatal termination. If, however, a person ignorant of the type of the fever be unreasonably confident of entire restoration to health on account of the absence of every unpleasant symptom during the interval, he will, very likely, exaggerate beyond all measure the danger during the paroxysm. What, in fact, can be more alarming to a novice, and disquieting to even the most experienced observer, than to find a patient extended and prostrate, head resting wherever it is placed, but usually thrown back, and the pillow under the neck; the mouth half open, the eyes either shut or wide open, and utterly deprived of expression; whilst there is entire immobility of every feature and limb, together with insensibility of both the trunk and limbs to the common means of irritation, by pinching or pricking the skin. But even at this moment, when the patient seems to be moribund, we notice a different expression of the face, which is relatively full, from that which is designated as the Hippocratic and precedes death in other diseases.

In passing rapidly under review the chief symptoms, I shall begin with the *tongue*, and here we find confirmation of the negative position advanced by Dr. Stokes in one of his earlier lectures, viz., that the appearance of the tongue often fails as a measure of the state of the stomach and digestive organs. Thus,— Dr. Bailly very frankly admits that if he had not examined the bodies of those who died of pernicious fevers, and if he had, as heretofore, admitted it to be a maxim founded on observation — that inflammation of the stomach is always revealed by redness of

the tongue, he would not have hesitated to assert, simply from an inspection of this organ, that there was no gastro-enteritis in intermittent fever. But as, in fact, he never, or hardly ever made a dissection without finding inflammation, he was compelled to alter his opinion, after having during the lifetime of the patient very seldom seen the tongue red. Not only was it not red, but it was often without the yellowish or whitish coat, which, as a matter of course, we expect to find in febrile cases, — whether we are believers in the gastro-enteric or in the hepatic pathology of the disease. So little importance do the Roman physicians attach to the appearance of the tongue in their fevers, that they seldom ask to look at it. I mention this fact as illustrative of the want of connexion often between the tongue and the stomach; but not as worthy of your imitation. Our own writers commonly speak of the tongue at the beginning of the fever being of a red colour at its tip and sides, and of a coated white or yellow, and sometimes a brownish hue, at its middle.

An equal difficulty exists in forming our diagnosis from the *pulse* in congestive fever — it being sometimes natural, sometimes full and frequent, or slow and full, and at other times small, frequent, and intermitting. Until the appearance of the cholera in an epidemic form amongst us, it was reserved for a stage of congestive intermittent or remittent fever, including an occasional case of yellow fever, to exhibit the singular phenomenon of a patient being entirely pulseless, even up to the large arteries, and yet to preserve his intellect and sometimes power of locomotion. Contrasted with this picture of a particular stage or variety of the fever is that of another, in which there is an alteration of sensibility, thought, and motion, and yet a full, strong, and regular pulse, and a skin bathed with sweat. This last feature will enable us to distinguish the disease from apoplexy, in which the skin is neither hot nor moist, and the expression of the face is rather of a person sleeping than of a patient in the paroxysm of fever. As regards *temperature* of the skin, — if the physician find the surface, particularly that of the extremities, of an icy coldness, and yet a retention by the patient of intellect and motive power, he may be pretty sure that he has a case of algid congestive fever before him. The inflammation of a viscus which would produce similar coldness just before death, would also give rise to an extreme feebleness and approaching extinction of the other functions at the same time. In reference to the state of the skin on the inception of congestive fever, you will find that whilst the surface generally is cold, dry, and somewhat shrunk, the upper part of the chest and the neck and forehead are in a state of moisture.

Gastro-intestinal Symptoms. — We know that the invasion of most fevers is marked by gastro-intestinal distress, nausea, and vomiting, and often heat, and sometimes pain. The accession of congestive fever is frequently announced in a like manner; but there is little proportion between the discharges from the alimentary canal and the intensity

of the disease. The irritation of the stomach and duodenum may be extended to the liver, and bile be mixed with the ingesta and mucus thrown up by vomiting, or show itself in the stools. Commonly, however, there is a suspension of the natural secretions and excretions, and often of late years in their stead a serous fluid is largely poured into the intestinal canal, and as largely discharged *per anum*. The quantity of fluid thus secreted is not an evidence of excessive congestion, or accumulation of blood by inflammation in the vessels of the intestines; for, often, these phenomena are very evident, although the secretion be small and almost arrested, and in cases in which it has been largely poured out, the mucous surface and glands were neither inflamed nor surcharged with blood. The symptom of inordinate serous discharge is to be regarded as proof of high irritation of the abdominal nervous system by which the function of the secretors is strongly excited: — and in the remedies for allaying this irritation we shall discover the means for arresting the excessive discharge. Its periodical return or exacerbation will be farther proof of the correctness of the nervous pathology now advocated.

Of the secretions which have most influenced the diagnosis in periodical fever, simple or congestive, the urine is chiefly entitled to notice. A reddish, brick-dust sediment has long been alleged to be a characteristic symptom. Sydenham, among others, speaks of "the colour of the urine, which in intermittents is mostly of a deep red (but not so red as in the jaundice), and likewise lets fall a lateritious sediment." Now, although we cannot receive this symptom in the unlimited sense in which it has been announced, still it is an important aid in forming a judgment, when we find diseases of a mixed or complicated nature, sometimes without, but more commonly attended, with fever, and recurring or being aggravated at irregular intervals. A similar sediment is an index to an inflammatory affection, or at least to its partial remission, although in this case there is a cloudy or thickened portion of urine, which affects its transparency, rather than a dust-like precipitation at the bottom of the vessel, which mixes uniformly with the urine, as in intermittent fevers. The urine in these last affections is quite limpid; the sediment when at rest forms a very thin layer at the bottom of the vessel, whilst in most inflammatory affections the sediment, even when the urine is at rest, has some lines of thickness; and it is partially blended with the upper portions of urine, whose specific gravity seems to be the same with it. It resembles, in fine, clay diffused in water, and not a colouring matter heavier than the urine, such as we find to be the case in intermittent fevers. In conclusion, we must not suppose that every disease in which this brick-dust sediment is manifested in the urine is a periodical fever; but, when we find ourselves in a country during a season in which these diseases are liable to occur, we may reasonably suspect that the one before us, even though masked, is of this character.

The symptoms depending on the *modifications of sensibility* in congestive fever are not uniform in occurrence or intensity, and in this respect differ from those furnished in simple inflammatory remittent fever. Pain of the stomach and in the abdominal region generally, either original or by pressure, is not complained of by the majority of patients in the disease now under consideration: — and yet it is worthy of notice, that in some of the cases recorded by Dr. Bailly, the person who was apparently insensible to all stimuli exhibited great distress when decided pressure was made on the abdomen. I have frequently myself noticed the same thing in persons who were lying comatose in congestive fever. Some of our own writers, in describing the symptoms of congestive fever in the southern states, mention the extreme tenderness of the abdomen on pressure below the umbilicus. It has been said, and I believe truly, that, although the nervous system is impressed in warm countries, in a manner and with a display of aggravated symptoms of great excitement not generally seen in northern regions, yet it does not manifest in the former case, so uniformly as it does in the latter, the minute degrees of sensibility by its sympathising with an inflamed organ. Of this fact examples are furnished in the cases of Dr. Bailly; for, notwithstanding that arachnitis was so frequent, there was not by any means corresponding frequency of pain referrible to such a cause, nor disturbance of cerebral function which would naturally be thought to ensue. The changes of tissue in inflammation are modifications of secretion and nutrition, which may or may not be announced by pain or irritation of the nervous system; and hence an important inference, that the absence of pain is no proof of the absence of inflammation; and conversely, that a very slight change in organic life may be responded to by the nervous system in such a way as to give rise to violent pain.

The pains in congestive fever are of two kinds: 1, those in the period of chill or concentration; 2, those of the period of expansion or heat. A knowledge of these, as also of the pains during the apyrexia, is only to be acquired by experience, and not by induction from pathological anatomy. Their recurrence after certain intervals, and union with fever, in which we cannot see the usual indices of inflammation, may induce suspicion of the nature of the disease. Headache, the most frequent of the lesions of sensibility in periodical and congestive fever, is most severe in the hot stage, or that of reaction, in the majority of cases; but sometimes the cold stage is the one of greatest suffering in this respect.

Prognosis. — As regards the *prognosis* in congestive fever, you may readily infer that it is by no means easy. It is a common impression that, as the congestion is greatest during the cold stage, the danger is greatest; and that death, when it occurs, is most apt to take place at this time. But this is an error. Cleghorn says; "I have seen some expire in what may be called the first stage of the paroxysm; the skin being chilled and wet with cold sweats; their pulse small and irregular, and their senses entire to the very

last; but the greatest numbers are hurried off in the height of the hot fit, stupified, senseless; the breathing short and laborious, and the skin covered with a burning fever sweat." And in another page he says; the most formidable paroxysm which I have seen broke out into a burning heat at the beginning without any previous cold. And in looking over Bailly's numerous cases, I find that death in nearly all came on during the period of reaction, imperfect reaction indeed, but still in the stage succeeding to that of chill and first invasion. The accession was, as I have already stated, generally in the morning, and the death occurred in the afternoon and night. Of thirty-one mortal cases, death took place in twenty between 2 P.M. and 10 P.M.; five in the morning; two at noon; four between midnight and 3 A.M. In the post meridian twelve hours, or rather from about 2 P.M to 2 A.M., the deaths were twenty-three out of the thirty-one. In the cases which terminated fatally in the morning, the accession was on the preceding evening. In most of them the skin was warm and often bathed with sweat, sometimes of a viscous kind in the last and fatal stage.

It has been already stated that the danger in congestive fever is to be estimated more by the violence of the symptoms in the paroxysm, than by the length and tranquillity of the intermission. "Those fevers are most to be dreaded," says Cleghorn, "whose violence is greatest on the even days (counting the day of accession as one day); and if the paroxysm stops on the third, fifth, or seventh day, but continues on the fourth, sixth, or eighth day, we must be upon our guard, lest a sudden stand should succeed this treacherous intermission." I refer with more freedom to the history of tertian fevers and the reflections of authors on them, as I am convinced that the congestive fever in our southern and western states is but a masked or malignant tertian, commonly of a double kind, in which there is a daily paroxysm, — but with a sameness in the symptoms and hour of recurrence between the paroxysms of alternate days only. The shortness and obscurity of the interval, or rather the prolongation of the period of the paroxysm, make the fever approach to the continued type, or at any rate lead the physician to suppose that he has a case of remittent fever before him, while the symptoms of congestion or inflammation of the organs, such as the brain, the stomach, and spleen, give origin to different names for the fever, and cause entire forgetfulness of its original type.

The following description by Cleghorn is a better guide for prognosis of a fatal result than can be found in more recent works. "But the utmost danger is to be apprehended, if a few drops of blood fall from the nose; if black matter like grounds of coffee is discharged upwards or downwards; if the urine is of a dark hue, or strong offensive smell; if the whole skin is tinged with a deep yellow, or anywhere discoloured with livid spots, or suffusion; if a cadaverous smell is perceptible about the patient's bed; if in the time of the fit he continues cold and chilly, without being able to recover heat; or if he become extremely hot, speechless, and stupid,

has frequent sighs, groans, or hiccups, and lies constantly on his back, with a ghastly countenance, his eyes half shut, his mouth open, his belly swelled to an enormous size, with an obstinate costiveness, or an involuntary discharge of the excrements: which formidable symptoms, as they seldom appear before the third revolution of the disease, so they frequently come on, both in double and simple intermittents, during the fourth, fifth, or sixth period, even where the smallest danger was not foreseen: but at whatever time the greater part of them occur, they afford a melancholy prognostic; for notwithstanding they sometimes go entirely off with the paroxysm, and the patient seems to be left in a fair way of recovery, yet most commonly they return in the next period with double violence, and terminate in sudden death." On the same authority as the foregoing, we may say, that the stage of the paroxysm which the patient usually got over with most difficulty, will most probably in the end prove fatal. The following observation, confirmatory of some preceding remarks which I made on diagnosis, is worthy of being remembered: "that as in all acute diseases, so particularly in those fraudulent deceitful fevers, the presages either of death or recovery are not always certain and infallible; it frequently happening that those who have laid in the paroxysm for hours together with few or no signs of life, have at length recovered as it were from the jaws of death, and asked for some uncommon sort of food, to the great surprise of everybody about them; on the other hand the fit, anticipating sometimes, brings on death before the time it was indicated."

In proof of the uncertainty of prognosis in congestive fever, I may cite the case of a man which I attended in 1823, when the various forms of periodical fever were so common in the suburbs of this city, and in the adjoining country. My patient had a subintrant tertian, one paroxysm coming on in the evening, another in the following morning; the latter the more violent of the two: he had, towards the conclusion of the fever, involuntary discharge of feces and urine, and exhausting or not critical sweats; but yet he recovered to the possession of entire health, and is still living.

We shall attack different significations to a symptom according to our knowledge or belief of its organic origin. Thus, coma of a simply nervous character, or somnolency, is a state which may be compared to that of sleep in excess, and it will not inspire the same alarm as that other kind which depends on organic lesion,— inflammation, for example, of the cerebral substance, or a congestion which presses this organ on all points, or, finally, a serous or sanguineous effusion. In the first or nervous coma the patient can be awakened if we call and shake or pinch him; thus evincing consciousness, although he relapses very soon into his former state. In the other kind of coma from organic lesion, the patient cannot be roused by all the efforts which are made; he neither sees nor hears anything, nor displays any sensibility to the strongest irritant, including fire itself. Coma in the onset of a fever constitutes the

predominant symptom; it is of more unfavourable augury in the advanced stage of disease. That which persists during the apyrexia would seem to indicate a dangerous lesion of the brain, a result which may be brought about by the persistence of even the nervous coma. This latter may be accompanied with automatic and convulsive movements, *subsultus* and contraction of the limbs; all of which are less dangerous than a flaccid state of these parts. In general, coma is more dangerous in old persons, and in adults in the vigour of life, than in children, in whom nervous irritation is easily excited, and who are more frequently attacked with nervous coma than with other varieties. The eyes in coma may be either closed or wide open, but I am not prepared to indicate with precision the different circumstances under which these symptoms are seen.

Forming part of the prognosis in congestive fevers of the malignant intermittent and remittent form, is the question as to their *duration*, and whether they have not a *natural tendency* to terminate after a particular period. The weight of observation is decidedly in favour of there being such a limited duration. There is a passage in Cleghorn, to show the complications of the fever, which ends in the following terms: "Nevertheless, if death be not speedily the consequence of this confusion they commonly again put on a more simple or regular form, and after one or more slight paroxysms go away of their own accord." And again: "But it is much more common to meet with tertians which set out furiously; with subintrant double paroxysm, so that for some days they have little or no interval. On the third or fifth day a profuse sweat commonly brings on an intermission; and afterwards the disease assumes the type of a double intermitting tertian, or of a semi-tertian. Such fevers," continues Cleghorn, "I have frequently observed to terminate spontaneously on the seventh, ninth, and eleventh days, and for the most part they are less to be feared. Bailly makes the average duration of the periodical fevers in Rome to be between fourteen and fifteen days, on a basis of no less than 64,443 febrile patients received into the hospitals of *San Spirito* and *St. John of Lateran* during five years. To the latter institution the convalescents are taken, and are allowed to remain in it three days after they are cured in the first. A similar tendency to a termination is manifested in our own congestive fevers on the fourteenth or fifteenth day. With equal care in observing the course of this disease with that displayed by Cleghorn, we should probably reach the same conclusion; and, like him, express our surprise "at the constancy of nature in the production and progress of tertian fevers; the periods being perfectly similar in the Spaniards and in the English, and sometimes not very different in him who lay upon the bare ground, destitute of assistance, and those who are treated in the most judicious methods, under every advantage of fortune; and frequently neither the patient's intemperance, nor unskilful management, can alter their stated course, and prevent their terminating in recovery.

So much are those mistaken, who imagine that the bent of nature in acute diseases can be altered or contracted by every trifling and insignificant prescription." With this not very consolatory reflection to the pride of art, I close the consideration of the prognosis of congestive fever.

Post-mortem Appearances. — On looking over the histories of thirty-six cases of malignant intermittent recorded by Dr. Bailly which ended fatally, I find the proportion of structural alterations of tissue or organ to be as follows: Arachnitis, 25; Gastro-enteritis, 19; Splenitis, 18; Rupture of the spleen, 3; Diffluent spleen, 2; Cephalitis, 13; Gastritis, 7; Enteritis, 7; Alterations of the liver, 5 — of which 1 was by inflammation, 2 by congestion, and 2 by putrilaginous softening; Pneumonitis, 3; Pericarditis, 3; Peritonitis, 2; Parotiditis, 1; Œsophagitis, 1; Cystitis (biliary), 1. The tissue which suffered most frequently was the arachnoid, although not to the extent described by Dr. Bailly; since, as I have already mentioned, the symptoms of arachnitis are seldom if ever so distinctly declared as we should be led to infer from these cases. M. Louis thinks that arachnitis proper is a rare affection, and that the inflammation so commonly represented to be such is that of the subjacent cellular tissue. Commonly as the inflammation of the arachnoid is supposed to bring with it that of the brain, or at any rate functional derangements of this organ, there were cases in the preceding list in which the patient preserved his consciousness and intellect to the last, although dissection showed after death very evident arachnitis. If we were to add the 7 cases of gastritis to the 19 of gastro-enteritis, we should have 26 cases of gastric inflammation out of the entire number of 36; and in the same manner, if we add the 7 cases of enteritis to the 19 of gastro-enteritis, we find 26 cases of intestinal inflammation. The number of cases in which there was a union of arachnitis or cephalitis with gastritis, or with gastro-enteritis, was 25; and of arachnitis or cephalitis with enteritis, 7. We might say that there was inflammation of the brain, or of its arachnoid membrane, conjoined with some part of the digestive canal, and chiefly of the stomach, in 30 out of the 36 cases. There was inflammation in some part of the contents of the abdomen in every one of the whole number.

I wish to press these statistical results on your attention, and would ask you to bear them in mind when you read and hear of liver disease and hepatic derangement and congestion, as a great cause, indeed the chief cause, of congestive and autumnal remittent fevers. You will see from the above returns how poorly figures bear out this hypothesis. I was myself once, when a student, and for a while afterwards, under this hepatic delusion; so far indeed as to induce me to choose the liver and its diseases for the subject of my Inaugural Dissertation for the degree of Doctor of Medicine in the University of Pennsylvania. I remember very well being complimented by Dr. Chapman, then my teacher, and ever since my honoured friend, for the arrangement of the matter, and

the style of the essay; but he added, as I also remember — "You are all wrong." I will repeat the expression, gentlemen, to you, and say you are all wrong, if you allow yourselves to believe that the organic origin and support, either of the acute or sub-acute febrile diseases, which you will meet with in the summer and autumnal months, is in the liver. You will be doubly wrong if, on the strength of this erroneous pathology, you prescribe calomel, in every kind of dose, and at all hours and seasons, to remove this imaginary hepatic disorder. Even if the premises were real, and you had to deal with undoubted hepatitis and congested liver, the therapeutical inference, that mercury is the remedy which should be given early, freely and long, is a sad mistake.

If we look for the organ which showed most proofs of congestion we find it to be the spleen, which was affected either in this manner or with congestion and inflammation conjoined, or its tissue broken up, in 23 cases out of the 36 already referred to. Some writers are disposed to attribute the occurrence and repetition of intermittent fever either to congested spleen or to congested liver, but particularly to the former; and, in confirmation of their belief, they cite the frequency of the cases of enlarged and indurated spleen in persons residing in low and marshy districts of country, who are at the same time victims to periodical fever. But in this instance, and it is not a solitary one in medical inquiries and speculations, the effect is mistaken for the cause, and congestion, which is really the effect and product of nervous irritation acting on the circulation, is spoken of often as the cause of this abnormal state of the nervous system. The afflux of fluids and their retention for a while, constituting an orgasm of the part, is a consequence of nervous excitement, and what is more, it can follow from this cause alone. But if, in place of being simply a physiological phenomenon of temporary duration, as in the normal congestion of the organs of generation *in coitu*, of the mucous membrane of the stomach in digestion, and of the liver during this same period, and of the brain under the influence of strong yet pleasing emotion, it should become pathological and fixed — then, like any new body or growth, the congested tissue is a foreign and unpleasant stimulus to the nervous system on which it reacts, and which it sometimes continues to disturb and irritate in various ways. Congestion of the spleen and chronic splenitis may, therefore, be admitted to be occasional causes of intermittent fever and to contribute to its obstinacy; but of the relatively small account which is to be made of them, and of the circumstances under which this fever is produced and maintained, the following facts will satisfy us. First: intermittent fever, both simple and congestive, will make its attacks and recur without any evidence of prior disease of the spleen. Secondly: in cases of enormously tumid abdomen, owing to enlarged spleen, there is often no periodical fever present, or if it occur we can temporarily remove it by bark or quinia, and yet the enlargement remains.

LECTURE CI.

DR. BELL.

CONGESTIVE FEVER.—*Treatment of the First or Forming Stage*—Symptoms—Preventive and curative measures—Different stages—*Stage of depression;* to be treated by mild friction, counter-irritants, and evacuants—Avoidance of direct irritants—Opium in the comatose stage or variety—Its use to prevent the paroxysm—Auxiliary remedies—*Stage of Reaction*—Venesection or topical bloodletting—Advantages of cupping—Reaction after loss of blood—Removal of irritation from the stomach and bowels, by enemata—An emetic sometimes useful—Dry cupping and emetics—Cold affusion and cold drinks—*Period of Remission*—Early and free use of the sulphate of quinia—Real nature of this medicine—It is not a tonic or a stimulant, but rather a sedative—Dose—Experience in favour of large doses of it in different countries.

TREATMENT. — *First or Forming Stage.* — In picturing to you the varieties of malignant intermittent or congestive fever, distinguished by such formidable features as coma, delirium, convulsions, and icy coldness of the extremities, and excessive heat and distress in the abdomen, you are not to expect to find all or even a majority of the cases of this fever which you may be called upon to relieve, thus distinguished. You will find, however, the same order of parts affected; you will meet with gastric disorder manifested by nausea, loss of appetite, and alternation of thirst and indifference for fluids; pains of the head, back, and limbs; turbidness of the conjunctiva, altered hue of the skin, and great inequality of temperature, although the extremities will generally be cold whilst there is additional heat of the epigastrium and temples, and moisture readily induced in the upper part of the trunk; the intellect is clouded, senses less susceptible of their customary impression; bowels sometimes costive, sometimes giving frequent watery stools. It may be, and the circumstance is unhappily too common, that these symptoms, indicating the first or forming stage of the disease, will not come under your notice, — the sick person supposing that his disorder will soon pass off either with time, or by the assistance of some domestic prescription. Some from sheer obstinacy; some from avarice, by which they cannot forego the chance of a day's business-gains, at the risks of protracted sickness, perhaps even of loss of life itself; others, and they are to be pitied, from a fear of the deprivation of the money for their daily toil, by which their families are supported: all of these several classes of persons are backward, both in abstaining from habitual occupations, which only bring the disease into complete development, and in procuring suitable professional counsel for the removal of existing symptoms. Hence, in, perhaps, a majority of cases, the most valuable time for checking the disease is allowed to pass away, and the physician is not sent for until the patient has had a chill, and suffers from the fever which marks reaction. It is greatly to be wished that people were fully aware of the often irreparable mischief which a man does

to himself by his going about during the impending and forming stage of fever — at a time when the nervous system requires repose, at least to be abstracted from its habitual stimulants of mental occupation, light, and sounds. In health the heart is quickened, we know, many contractions, by the mere change from the recumbent to the erect posture, as evinced in the differential pulse: and hence the feeling of languor, amounting sometimes to syncope, in persons of a weak frame who are kept standing a long time. How illy, then, can the heart, irritated as it is by the excited nervous system in the inception of febrile disease, bear the additional strain upon it of an erect posture, and perhaps of muscular exercise superadded. Repose and a reclining posture are of the first necessity for an ailing person, whose instinct alone would lead him to seek them, were he not prevented by the suggestions of false reason and intense selfishness. Next to these, and as a necessary measure of comfort, tight clothes and ligatures of every description should be at once removed, and a covering for the body substituted, of such texture and amount as shall contribute to the restoration of an equable temperature. With this latter intention, simple warm drinks should be taken; and if the rigors be frequent, a warm bath, or in its place a warm pediluvium. As the chief irritation at this time, and, indeed, the chief functional disturbances, are in the series of organs contained in the abdominal cavity, and which are governed chiefly by the ganglionic or nutritive system of nerves, it is exceedingly desirable that no false step should be taken to increase the irritation and to complicate the disorder in this region. Hence, you will enjoin abstinence from all stimulants, and especially from nutritive ones; the excitement from which, beginning at the gastro-intestinal mucous surfaces, is continued through the absorbent, circulatory and secreting apparatus, as well as the lungs and nervous system, and lasts at least during an entire diurnal revolution, or twenty-four hours. He who should feel inclined, or be on the point of yielding to the persuasion of another, to eat any substantial food, after he feels any of the premonitory symptoms of fever, ought to be reminded of the strong probability of the disease being aggravated by this excitement of all the organs, whose functions are already impaired and which require repose, and that what he eats at a given hour to-day may tell against him at the same hour on the following day. It is of far greater importance for persons generally to be able to appreciate the signification of the first symptoms of fever, and when this is learned to abstain at once from all kinds of excitement, intellectual or bodily, sentimental or sensual, than for them to have learned how to use certain remedies with a view to check or cure the disease. But even this is not a fair statement of the proposition: the first point of knowledge would be of most unequivocal benefit, — the second is commonly mischievous.

Separating the directions for the treatment of congestive fever from the inquiries into general therapeutics, which I presented on a former occasion in connexion with this subject, you will learn that

the former are applicable to — 1, the period of invasion, and before the disease has declared itself with its characteristic and violent symptoms; 2, the stage of depression, commonly of chill, and often disturbance of innervation, and consequent congestion of one or more organs; 3, the stage of reaction, in which the disease assumes a more expansive character, and approaches in its nature to the hot stage of a common intermittent or remittent fever, but still exhibits evidences of oppressed functions, and more particularly of imperfect innervation and laboured circulation.

In the first stage, or that of invasion, the treatment is simple, but if carried out fully, will be efficacious. Its outlines are, rest for the functions of the nervous and muscular systems, and best in bed, with an avoidance of all the stimulants of light, sound, and addresses to the feelings and intellect; simple diluent drinks; an enema to evacuate the lower bowels; and warm water, or a few grains of ipecacuanha if the stomach be obviously distressed by the remains of the last meal, or if there be nausea and retching. The addition, after the vomiting has ceased and the subsequent diaphoresis is over, of a mild laxative, if pain in the head and limbs and incipient febrile irritation are present, will often suffice for a complete removal of the disease. But time must be allowed after the cessation of apparent disease, in order that the nervous system may go through its diurnal circle of functional and organic acts, and proof be afforded of its immunity from a recurrence of the primary symptoms, with perhaps aggravations. Hence, an invalid who subjects himself to domestic or formal medical treatment for twenty-four hours, ought to let a period of the like duration elapse before he encounters a renewal of his out-door or other active engagements, and returns to his customary food.

Stage of Depression and Congestion. — The remedies during the stage of depression with congestion — indicated by rigors, cold, small, and frequent or intermittent pulse, oppressed breathing, and feebleness of the intellect and senses, internal heat and thirst, are to be addressed primarily to the nervous system, and notably to its expansions on the skin and mucous membranes. To the first of these surfaces we apply assiduous and extended friction, the warm water bath, or warm air bath; to the latter tepid or cold water, according to the sensation, and opium either by the mouth or enema. If we know the state of the alimentary canal to be such that it is partly occupied by irritating matters; for, food in the stomach and feces in the colon, in the now irritable state of the mucous surfaces, are irritants, these ought to be first removed by the means already indicated, and then, if reaction is tardy and imperfect, the opium may be given.

In all this stage, which, though one of depression, is also of irritation, and not seldom of congestion and inflammation combined, we must abstain from the stimulants whose action is chiefly on the nervous system. Mild counter-irritants to the skin, and sedative treatment for the mucous surfaces — after their material irritants

are removed — will express the outlines of treatment; which does not therefore embrace either cauterization or disorganizing action on the skin, nor brandy or other analogous liquors internally. Of the counter-irritants, sinapisms kept applied, or dried mustard rubbed along the spine and on the inside of the legs, thighs, and arms, until sensation of a positive but not painful kind is produced, are useful.

I cannot but think *that in this first stage of congestive fever, the stronger the stimulus applied, the greater the probability of its producing an effect on the nervous system analogous to its then morbid state or one of painful irritation, the very excess of which had produced the numbness and torpor which impose on some for prostration and exhaustion.* But in speaking of numbness and torpor, I apply these terms to the condition of the encephalo-spinal portion of the nervous system, or that of animal life. The centre of irritation, that from which it radiates, is the abdominal nervous system, which makes up so important a part of that of organic life. Here the irritation is persistent, and is manifested by the activity of abdominal circulation, the pulsation of the aorta and its cœliac and mesenteric branches, increased afflux of fluids, and even congestion in the mucous membranes, liver, and spleen, and increased and perverted secretions from the stomach, intestines, and liver. It is the continued irritation in this region, which, transmitted to the brain, slowly it is true, because circuitously and through the plexus and ganglions of the sympathetic, fatigues this organ, and finally produces the state of coma, or of coma alternating with delirium and convulsions, which marks the worst form of congestive fever in its early stage. If this be correct pathology, then are stimulants, except of the mildest kind, such as warm teas, inadmissible; and a still farther and more direct conclusion is, that opium, or some one or other of its preparations, is demanded by the nature of the case. What! it will be exclaimed by some, — give opium, a narcotic, in a state of apparent apoplexy, or stupor which may be said to resemble that of narcotism? If the visceral congestion and the distended vessels of the brain were primary phenomena, and were not in the beginning, at any rate, effects of a disturbed nervous system, it would be rashness to give anything which might augment such a condition of the organs: but, as I have already more than once informed you, all these congestions and injections of tissue will often entirely disappear with the removal of the paroxysm, which, as far as we can see, is accomplished through the intervention and by the direction of the nervous system. If, therefore, we have any means of acting on it in a definite manner we control *quo ad hoc* the congestion, by either preventing its occurrence or carrying it off. In the circumstances now under consideration my pathology is in harmony with therapeutical experience, which points distinctly and emphatically to opium as one of the best, if not the very best and safest remedy prior to the coming on and actual supervention of the alarming state

of congestion which distinguishes the paroxysm in malignant double tertians or the congestive fevers of our country.

Among the cases of the curative effects of opium in a comatose stage of malignant tertian, is the following from Wirtenson quoted by Bailly: —

On the second attack of fever, which, like the first of the preceding evening, came on at eleven o'clock, a lady, who was the subject of it, fell into a profound coma, losing both speech and sensation — her eyes were open and fixed, her limbs stiff as in catalepsy; the pulse was small and intermittent, the respiration laborious. All the persons around expected death to close this scene in a short time. With a hope, however, of giving relief, some physicians recommended emetics, irritating enemata, or the application of blisters; in fine, recourse to stimulating remedies. But Dr. Hoffmann, who, happening to be on the spot, was called into consultation, had no confidence in the measures suggested, having in other cases ascertained their inefficacy. Still as there seemed to be no room for temporizing, and as the necessity of the case was urgent, he determined to make trial of opium. He accordingly poured into the mouth of the patient ninety-five drops of laudanum, which he saw her swallow. After a few minutes the pulse was developed and the breathing more free; and in less than half an hour the danger was over, together with the lethargy the pulse became full, the limbs had regained their suppleness, and the patient recovered her consciousness and began to speak. Febrile heat was evolved, and sweat, which followed in a few hours afterwards, put an end to the paroxysm. Bark was prescribed for the following day, but owing to the nausea, similar to that which had distressed the patient between the first two attacks, this medicine was rejected after every time at which it was swallowed. Vinous decoction and the extract of the bark were also thrown up from the stomach. Enemata of bark had not the desired effect. On the following evening the paroxysm returned at the same hour and was marked by the same alarming symptoms as before. Laudanum was forthwith given, with the same results and with the same success as on the former occasion. During the next and succeeding days, the vomiting and disorder prevented the use of the bark by the mouth, and its only mode of administration was by enemata. Fears were naturally entertained that a third paroxysm would supervene; and the husband of the patient, who had been a witness to the efficacy of the laudanum on former occasions, asked if it would not answer to give this remedy an hour before the expected accession. The suggestion was adopted, and its success was most satisfactory. The paroxysm came on, but without any alarming symptoms. After it was over, the patient was able to take the infusion of bark in wine, and in a few days she was entirely cured.

Opium, on occasions so beneficial during the first and even second stage of the paroxysm of congestive fever, has been used with good effects to prevent its accession at all. For this purpose it should

be given some time before the fit, or if opportunity is not allowed for its administration thus early, it ought to be so soon as the wandering pains in the limbs and trunk, headache, some rigors and nausea, furnish premonition of the expected paroxysm. In this case a full dose, as of sixty drops of laudanum, or a grain of the sulphate of morphia, may be given at once to an adult. When the paroxysm has come on, and the coldness and stupor are great, the propriety of a large dose, though it might seem to be justified by the apparent insensibility of the system, is not so clear. The plan which I should prefer, would be to administer, under these circumstances, five drops of laudanum in a table-spoonful of camphor water every five minutes until evidences of producing an impression on the system by a slight reaction, and some little abatement of the symptoms were seen; — then we might give a fuller dose, say thirty drops at once, and wait the result as far as relates to internal medicines for this period. Moderate, but continued and extensive friction with a warm hand or warm cloth, and a soft brush dipped in warm salt and water, should be had recourse to at the same time, in order to encourage the expansive action of both the nervous and vascular systems. The dry vapour bath, as of alcohol and simple warm air, are sometimes preferable to the warm water bath. In cases in which the individual is unable to swallow, the laudanum or solution of sulphate of morphia may be given by the rectum, in a small quantity of simple water rather than of mucilage, the more readily to insure its action on and absorption by the mucous surface of the rectum. If we admit the propriety of divided doses, twenty drops may be given every half hour until a hundred are used in this way. The union of assafœtida mixture will add to the good effects of the laudanum on the brain.

Stage of Reaction. — Fulness of habit, previous plethora, the probable prior existence of inflammation of the gastro-intestinal surface, or of the liver and spleen, or brain and its meninges, and incipient reaction yet still remaining oppression, will, severally, justify the opening of a vein and allowing a small quantity of blood to flow out. The diminution of the oppression and the persistence or development of fixed pain in an organ previously disordered, will indicate the advantage of taking away more blood at this time. But if doubts are entertained of the powers of reaction, or of the tolerance of the system under the sudden abstraction of blood, which may still be called for by other circumstances, then must recourse be had to leeching, or what is still better, to cupping.

Whilst I have little faith in the efficacy of venesection for the removal of congestion merely, I would not deny the utility, and often the necessity of this operation in cases in which there is inflammation associated with fever. That this is a common occurrence we have every reason to believe, as well after an attentive study of the symptoms as of the appearances of the organs revealed by *post-mortem* examinations. So soon, therefore, as febrile reaction is fairly established, or there are symptoms of its having begun, and

we find evidences of more than high nervous irritation of an organ or organs, our endeavour should be to arrest their supposed phlogosis by bloodletting. If opium have been previously administered, in the manner and for the purposes already indicated, the reaction will be of a simple nature; and as the nervous symptoms will have been removed or suspended by this medicine, the distress which remains may fairly be attributed to another or an inflammatory condition of tissue or of organs. In common, however, we cannot expect that full and entire expansive reaction so usual in the phlegmasiæ and in the exacerbation of regular intermittent and remittent fevers. Still, the vascular system is measurably brought into activity in conjunction with the nervous, and we are required to shape our measures in such a way as to act on and relieve both, and in the belief, also, that we have inflammation to combat. The manner in which blood is to be abstracted as well as its amount are matters of weighty consideration. If the operation is intended to be tentative, and as a means of trying the extent of the latent powers of the system and its capability of reaction, a small bleeding is to be first practised; and the safer mode of doing so will be by cupping or leeching. More especially is this selection to be insisted on if the circulation is yet sluggish, the chylopoietic viscera are congested, and the torpor of the cold stage measurably remains. By cupping or leeching, we not only abstract blood from the circulation, and thus relieve the suffering organ as we would by venesection, but we give the heart more time to accommodate itself to the altered quantity of blood than after a large vein is opened; at the same time that we procure the benefits of revulsion or counter-irritation, in making the scarified or leech openings on the skin so many points of afflux; in fine, there ensues temporary external congestion which we oppose to the more enduring internal congestion. Under the pathological view indicated respecting intermittent fever, the cups or leeches might be applied to the back with advantage.

The reaction which follows venesection in cases of extreme depression in the cold stage of congestive fever, is indeed a sequence, but not so often, if at all, an effect of the operation, as is commonly supposed. It is an evidence of the recuperative powers of the nervous and other systems which were merely suspended or perverted in their manifestations; but it does not depend on venesection for its occurrence. When we row with the tide our boat goes bravely onwards, and we regard with complacency the effects of our strength and skill in the use of the oars: but let the tide be adverse, and the same strength and skill which were thought equal to any exigency of this nature are not enough even to give our boat headway. So it is with bleeding: if there is vitality enough and the circle of action tends to revival, we congratulate ourselves on what we have accomplished by the use of the lancet; but if the tendency is the other way, or towards an extinction of the powers of life, our

boasted instrument will be of no service in aiding us to prevent the fatal termination.

But of the real quality and cause of this reaction after bloodletting, and of its duration, we can have only very imperfect ideas, so long as there is foreign and irritating matter or undigested remains in the stomach and small intestines, and fecal accumulations in the large. Even if these matters were not the primary cause of the fever, they become, in the state of altered sensibility and organic action of the gastro-enteric mucous membrane, a cause of irritation and of aggravation of the original ills. To the means, therefore, for their removal ought we now to direct our attention. Cognisant as we are of the diversified sympathies of the colon with the rest of the abdominal organs, and of the great relief to oppressed respiration and circulation brought about by an evacuation of its contents, one of the very first steps in the treatment of congestive fever must be the administration of a purgative enema, and its repetition until a free operation is procured. As the digestive mucous surface is in a state of active irritation in this fever, and is inflamed in places, we can use agents of more reduced power than those which at first would seem to be required by the depression of the system. Simple tepid water, or salt and water of the same temperature, thrown up in full quantity and at short intervals until there are free evacuations of fecal matter, will often suffice. In more torpid states of the system, spirits of turpentine in a dose of half an ounce, mixed with castor oil or common suet and mucilage, has an excellent effect. After the full operation of these enemata, if the internal abdominal heat still persists and the skin and extremities are cold, simple injections of cold water will greatly contribute to equalize temperature and vascular and nervous excitement. The retention of the fluid in the colon tends to allay heat and thirst, and by its absorption will probably exert a salutary operation on the blood. If there be too great a crasis of this vital fluid, and slowness of circulation, a minute quantity of common salt in the water will enable us to meet the indication furnished by this state of things. But if the general torpor continues after the first free evacuation of the lower bowels, it will be advisable to try the opium practice at once, by your giving an enema of laudanum, or sulphate of morphia, in the manner already directed. This course procures, in addition to the advantages before detailed, tranquillity of the stomach, and prevents an excuse for the administration of various effervescent and other draughts intended to allay its irritability and to check vomiting, but which in fact are themselves troublesome irritants, and fail to accomplish the ends proposed.

Should there be, from the beginning, nausea and imperfect vomiting of glairy mucosities and of particles of undigested food, it will be your duty to make the expulsive efforts more complete by the administration of a few grains of ipecacuanha, and subsequently of tepid water or warm camomile tea. Not only will the stomach be freed from irritating matter by this means, but the entire nervous

system of organic life will be roused to a series of efforts which will tend greatly to substitute expansion for morbid concentration, and to incite the secretors, mucous and glandular, to a fuller and more harmonious effort. But it must be remembered, that the general perturbation, the sickness, nausea, and depression, which precede vomiting, and the increased capillary action and secretions, including perspiration, which accompany and follow the act itself, simulate a paroxysm of fever, and like it require a regular period for its progress and completion. The administration of an emetic is not, therefore, a mere incident, which is to be hurried through as rapidly as possible, in order to pour down enormous doses of calomel, or, worse again, drastic purgatives, or to bleed, blister, &c. Time, as I have said, is required for the series of effects which follow to be completed; and it is only after their completion that you can take proper cognisance of the condition of the system, and of the necessity which exists for other measures, or for allowing rest. An emetic will precede the use of the lancet, or local depletion, where the gastric distress is the predominant symptom, and the depression of the nervous system and concomitant congestion, with rigors, cold extremities, &c., well marked; or it may establish such relations among the organs as to render bloodletting unnecessary.

In cases of extreme concentration of vital action, dry cupping and emetics will be consistent practice; a little more action, and a belief that the internal viscera are suffering from inflammation, will recommend scarification and cupping, or leeches, with an emetic. Purgatives are not of indispensable necessity in the first fit or the depression of fever. When reaction is established and quinia has been given, calomel may be used in full doses or given with quinia.

Sometimes it happens in the worst form of intermittents in hot countries, as Lempriere tells us was the case with those of Jamaica, that the chill is very short and the hot stage is exceedingly violent, often accompanied by delirium; and that, after lasting from twelve to sixteen hours, it leaves, finally, the patient in a state of extreme and alarming debility. Now, in a case like this, unless there were evident complication of phlegmasia of an important organ, it would not seem wise to try to abate the violence of the paroxysm by bloodletting; and if we have recourse to the remedy, preference ought to be given to topical depletion. It is on such occasions that cold affusion, or at least a sponging of the surface with cold water, is both soothing and useful. Contributing to the same end, are the administration of cold water enemata and the use of cold water for drink, or of a small piece of ice allowed gradually to dissolve in the mouth. If acid be agreeable to the patient, or a slight bitter, the water may be flavoured accordingly; the only restriction being on the score of the quantity of the fluid, which ought not to be so great as to distend the stomach, and in this way prove a source of irritation. There is hardly a medicine which can be given during this last stage without irritating the stomach and increasing the general

restlessness, unless, indeed, it be opium, and it only when we are sure of the ascendency of irritation of the nervous system. A full dose, as of ten to fifteen grains of calomel will be found to soothe irritation at this time, when, however, drastic purgatives would do harm. Most of the febrifuges, so called, are more than equivocally hurtful. Some of the saline preparations might advantageously insinuate themselves into the mucous absorbents, and enter the circulation with the aid of a liberal supply of a watery vehicle in the way just mentioned. The neutral mixture, the acetate of potassa, sesquicarbonate of soda and nitre, might be given in this way; but, I repeat it, rather as part of the drink of the patient, of course in large dilution, than in separate and at all strong doses. There is greater probability of a more perfect remission by these simple means and of an approach to a crisis, indicated by more copious perspiration and renal secretion, than if purgatives, calomel, antimony, and nitre, had been given during the first period of febrile exacerbation. Even the pet organ, the liver, will be more apt to recover from its irritative congestion, and secrete bile by this aqueous and saline regimen, than if it had been appealed to by means of the alleged specific and never forgotten calomel. If this period of febrile excitement has been reached without evacuations from the stomach and bowels — and there are nausea and efforts to vomit, it will not be amiss, nor in contravention to the opinions which I advocate on this subject, to give a draught of tepid water, or one in which a table-spoonful of salt has been dissolved, in order to evacuate the stomach of its contents, and even to break the bad habit which it had acquired for some hours previously. With a similar view, the lower bowels might be emptied by a simple laxative enema, as of salt and water, melasses and lard and water, or gruel. But by far the most grateful and the best refrigerant and febrifuge at this time will be, in addition to cold affusion, cold or iced water in small quantities at a time for drink, and if the abdominal heat be intense cold enemata also.

Period of Remission and Intermission. — A remission or intermission having been established, a question then arises, which requires prompt solution preparatory to decisive action, as to the measures by which this may be prolonged and the recurrence of another febrile paroxysm prevented. He who, forgetting the violence of the first paroxysm and the manner in which the chill was ushered in, should now think his patient out of danger, and either leave him to himself, or recommend merely light or perhaps animal food, commits a perilous mistake, of which he will be painfully reminded on the supervention of the next, and it may be the fatal paroxysm. Nor will it be prudent, even if a continuation of active remedies be determined on, for you to rely on purgatives with a view of cleansing out the bowels and of restoring the secretions from them and the liver, or on blisters as counter-irritants, in order to prevent the coming of the next exacerbation. Purgatives in congestive fever, especially those of the saline class,

often play us false, and bring on choleric, or serous and exhausting discharges, followed soon by extreme and dangerous prostration and collapse. Blisters have little efficacy in preventing the recurrence of irritation of the nervous system in periodical fevers, as I the more readily believe from personal and painful experience. I have had five blisters on my own person at one time without their preventing the return of a chill, although I had no reason to believe that there was an inflammation of any organ at the time. What then remains to be done in the emergency before you? Appealing to an experience which extends through centuries, and is the result of the observations of many physicians in different countries, you will lose no time, after a remission is clearly evident, or even just begun, in giving quinia now, as a few years ago you would have given bark. But you will not be induced to give it as early and as freely as you ought, unless you regard its therapeutical agency in a different light from that in which it is ordinarily presented to us. If, as is commonly done, you look upon it as a tonic, you will wait for debility to furnish a requisition for its use: if as a stimulant, you will fear to administer it in cases in which there is obvious excitement, or less evident, but yet real phlogosis. Now, it is neither a tonic nor a stimulant; nor, although it sometimes arrests fever in the middle of its course, is it entitled to be called an antiphlogistic. The effects of bark on the animal economy are not identical with those of either bitters or astringents, any more than its chief alkaloid principle, quinia or quinine, is identical with the alkaline principles of these latter, as far as they have been discovered. Unlike stimulants proper, it has little or no immediate action on the vascular system; nor does it seem to modify nutritive life by action on the capillary tissue so much as tonics proper. If we would ascertain the real effects of bark or of quinia on the animal economy, we must do so by watching its operation on the nervous system; and by the extent of its impression on this system can we measure its influence generally on the other organic systems and apparatus. If its effects extend to these, it is through the intervention of the nervous system; and if it cure fever by preventing a return of a paroxysm, or by modifying organic acts in the midst even of one, it is in virtue of the peculiar manner with which it impresses this system. But if it be neither a tonic nor a stimulant, by what term shall we designate its mode of action. Admitting that the pathology of congestive fever of the double tertian or remittent kind, which I have endeavoured to explain, is correct, — and that the circle of morbid phenomena, on which the type and its peculiar character chiefly depend, originates in, as it is kept up by irritation of the nervous system, then ought bark, or its representative, quinine, which arrests and subdues this irritation, to be called a sedative. But it will be alleged, in reply, that in various conditions of exalted and perverted sensibility, this medicine displays no such sedative influence. As applicable to the nervous system of animal life or the encephalo-spinal apparatus, the remark is just. But in fevers, par-

ticularly those of which I now speak, the irritation, the sustaining cause of the periodical disturbances in the brain, spinal marrow, and their dependencies, radiates from the abdominal nervous system belonging to organic life. Opium is capable of allaying this irritation and of bringing the paroxysm to a close, and, on competent authority it may be added, of preventing its return; but opium exerts, independently of its effects on the nervous system, a strong action also on the capillaries: it is apt to cause narcotism and complicated symptoms transcending the degree of simple sedation. Quinia limits its action very much to the nervous system, producing neither narcotism on the one hand nor vascular excitement on the other; but as near as may be a sedative operation, which, like all the sedations caused by other medicines of the least mixed nature in this respect, will, however, at times be blended with some unpleasant sensations. Of these, a humming sound in the ears, slight deafness, and a feeling of tightness or stricture across the breast, are the most usual. So, also, dryness of the mouth and fauces, and sometimes slight febrile excitement, may be expected after taking quinia; but as in the case of other sedatives, these bear no proportion to the subsequent ease and soothing effects.

If we are desirous of making an impression at all decided on the nervous system, and through its sedation of allaying the febrile disturbance of the functions generally, five grains of sulphate of quinia is the smallest dose which we should think of prescribing for an adult, whose idiosyncrasy is not such as to forbid the use of the medicine beyond minute doses. Nor should we rest content here; we ought to direct a repetition of the dose once or twice more, at an interval of two hours. The preferable mode of administration, with a view to obtain its earliest effects, is in solution and in such a medium as will prove most palatable to the patient, and be most likely to insure its retention by the stomach. Contributing to the latter end, and harmonising well with the quinia, is a dose of about twenty-five drops of laudanum with camphor water; and for the former, cinnamon water, or lemon or ginger syrup. When convinced of the propriety of the union of quinia and opium, a neater formula, and one in the administration of which there will be less liability of mistake by the nurse or other attendant, is a solution of the two sulphates, as follows: — ℞. Sulphat. quin. ℈i., Aquæ camphor. ℥ij., Sulphat. morphiæ, gr. ss., Acid. sulphuric. gtt. vi. M. ft. solutio. Dose, a table-spoonful in any fluid most agreeable to the patient. You are, of course, aware that the sulphate of quinia, as an imperfect salt, is not entirely soluble in water, and hence the addition of a few drops of sulphuric acid is necessary.

In cases of more intensity, and in which it is of the utmost importance to produce a full and strong impression on the nervous system, so as to prevent, if possible, a renewal of the fever, or rather a recurrence of the paroxysm which might end fatally, a still larger dose of quinia is not only admissible but required. Dr. Bailly, on this point, says that physicians need not be under any

apprehension from the effects of large doses of this medicine. "If fifteen grains, divided into three or four doses, suffice in common cases of intermittent fevers during the day of apyrexia, we must give twenty, thirty, forty grains, and even more than this, in a few hours, if we are in dread of the effects of a paroxysm, the first accession of which placed the patient in peril." In some of the cases in the hospital of *San Spirito*, twenty grains of the sulphate of quinia were prescribed in the morning, and taken before the afternoon paroxysm. Dr. Bailly himself took a hundred grains of the sulphate of quinia in five days for a slight febrile disorder, when he was at Rome; and he declares, after an attentive analysis of his own feelings, that he was unable to detect any evidence of irritation, which this quantity of the medicine would certainly have produced if it had been of an irritating or stimulating nature. In one of the hospital cases recorded by this gentleman, he mentions seven ounces of bark to have been taken in one day by the patient, — which would be equal to nearly sixty grains of quinine. Dr. J. K. Mitchell, of the Jefferson Medical College, in conversation on this subject, stated to me that he gave to a patient, who was in the last and apparently fatal stage of remittent fever, sixteen grains of quinia, and with such good effect, that from that time the violence of the disease was subdued and convalescence soon established. He felt the more confidence in so large a dose, from having known a man to take in the course of a day, by a misapprehension of advice for the manner of using them, a box of pills consisting of sixty grains of quinine, and with no other inconvenience than a singing in the ears. But let us avoid an inference, which is sometimes hastily and erroneously drawn from a knowledge of the toleration of the system to large doses of a medicine, that it has not the activity commonly attributed to it. Even if we were not apprised of the fact in various instances, one under Dr. Mitchell's own notice shows by how small a dose some persons are affected. His patient, an aged adult, cannot take an eighth of a grain without being troubled with a singing in the ears and other nervous symptoms.

Still more decided testimony in favour of the efficacy of large or, as the writer calls them, mammoth doses of quinia, is borne by Dr. J. E. May, of Madison county, Alabama, (*Transylvania Journal*, vol. x.) who cites the corroborative experience of Dr. Thomas Fearn. Dr. May, on the occasion of his having been attacked with a quotidian remittent, the paroxysm of which came on about ten o'clock in the forenoon, and the remission at one or two at night, took on the fourth evening of his disease, ere the fever had yet left him, fifteen grains of quinine, which he repeated every two hours until a drachm had been thus used. He had himself copiously bled just before he began to take the quinine. The effects are thus narrated: "Instead of the usual remission I had a complete intermission. The fever left me while I was taking 15 gr. doses of quinine. I passed the day without the recurrence of the fever; was affected

with some degree of stupor, ringing in my ears, and deafness; but with no other uncomfortable sensation. A dose of calomel taken about eight o'clock, forenoon, brought off evacuations of the consistence of black clotted blood. The quinine was continued for ten days, in smaller quantities, and my bowels kept open with calomel, rhubarb, and aloes, and my recovery was rapid." Dr. May states, that "when under the full and proper influence of quinine, healthy biliary secretions are readily set up, and by means, too, which under other circumstances had failed." In another case of fever "of a malignant character," of three weeks' duration, the patient was "in a state of extreme prostration; pulse one hundred and eight in a minute, and exceedingly small and compressible; copious watery discharges passing from his bowels six or seven times a day, as he lay, without the power to control them: and by no means the least unfavourable symptoms were colliquative sweats, parched lips, an utter inability to sleep which had lasted for several days, with delirium during the night." The quinine in two-grain doses had been administered, but it was thought to have produced irritation. "It was now concluded to give the quinine a trial in ten-grain doses; his case being considered at best a desperate one. I," says Dr. May, "was entrusted with the administering of the medicine, with liberty to increase the dose to fifteen grains if the first ten should not produce the effect anticipated. This was manifestly done; and I accordingly gave him fifteen grains in each of two succeeding doses, making in all forty grains in two hours." The effects were such, that in one hour after the patient had taken the third portion his pulse was reduced to eighty-eight in the minute, with a more than corresponding increase of volume. All the unfavourable symptoms in a great measure subsided. The patient slept several times during the evening, and had a better night than he had passed for many previous. A blue pill given at night, produced in the following morning fetid discharges; and a favourable crisis in the case was manifest. On this day, three fifteen-grain doses were administered at intervals of an hour; he had no return of fever; rested well at night; a mercurial cathartic produced evidence that the proper secretions from the liver were excited; the patient was treated with smaller portions of quinine in the forenoon, and purgatives at night, for two or three days after; and in two weeks was up—" Cases are given of complication of pulmonary disorder with gastro-hepatic derangement and delirium sustained by intemperance, and reducing the patient to the lowest state, but which were cured by large doses of quinine. Dr. May very properly remarks, in coincidence of opinion with the older writers already quoted, that when the affections of the chest "are evidently regulated by the remittent, aggravated in the exacerbation of the fever, and moderated in the remission, they may be set down as symptomatic, and so treated." Dr. Drake (*Western Journal*, vol. xi.), after noticing Dr. May's paper, adds,—"We are pleased to meet with this new testimony to the safety and value of

large doses of the sulphate. Dr. M. seems to regard them as without precedent, but in this he is mistaken; at least ten years ago Dr. Perrine, of the state of Mississippi, administered this medicine in such quantities as to amount to a drachm in a single intermission, and we ourselves, for many years past, have been accustomed to give it in doses of ten or fifteen grains. We have also been in the habit of combining it with calomel, a practice which is general among the physicians of this quarter. Of the harmlessness of large doses we some time since had conclusive evidence, by being called to see a man the next day after he had, by mistake, taken a drachm at one portion. He still had a roaring in his ears, but was walking about the house, and had not experienced any formidable symptoms. They, who limit themselves to small doses at short intervals, are not aware how much, *in many* cases, they sacrifice to their timidity. To a patient who laboured under a neuralgic affection, apparently of miasmatic origin, we lately, in conjunction with a medical friend, administered a scruple daily for five or six weeks, without any other sinister effect than a noise in the head and a slight degree of deafness. It was given in five-grain doses, combined with ten grains of nitrate of potash."

Dr. Perrine, to whose practice in the free use of the sulphate of quinia, Dr. Drake refers, tells us (*Amer. Jour. Med. Scien.*, vol. xi., p. 250), that he used and recommended large doses of the Peruvian bark frequently repeated during the paroxysms of fever. "The medium dose of the sulphate of quinine at any period of fever, from its incipient to its terminating symptoms, is ten grains, to be repeated every two hours whatever be the state of the pulse and skin." He believes it to possess sedative powers.

It is pleasant to find on this important question of how a disease of so much violence and danger as our congestive fever should be treated with such a general accordance among practitioners in different and remote countries and times. Thus, the practice of giving large doses of bark adopted by Torti in the pernicious remittents of his day, carried out fully by the Roman physicians of the present time, as we learn from Dr. Bailly and other sources of information. It is that adopted in our own country, and it is that, also, which has been found most successful by the French physicians in Northern Africa. I was not aware, when I inculcated two years ago that which I believed to be the correct pathology of congestive fever, and the treatment adapted to the cure, that Dr. Maillot had carried out precisely similar views by the same practice. In violent intermittents inclining to the pernicious, his course was identical with that which I have prescribed for upwards of twenty years. He bled the patient when first seen either in the apyrexia or in any stage of reaction. If there remained headache in the interval, at least fifteen ounces of blood were taken away; and if the intestinal canal was irritated, leeches were applied to the epigastrium. If these symptoms were violent during the paroxysm, and still severe in the interval, twenty or twenty-five, or thirty

ounces of blood were taken at once. These free bleedings were not, M. Maillot states, as well borne after the spring and in the great heats of July. It will, I believe, be generally found, that in the warmer latitudes, even in Southern Europe, the use of the lancet is not borne, is not in fact required in fevers, as it is farther north; and hence, in my preceding advice for the treatment of our congestive fevers, as they are met with in the Southern and Southwestern States, I suggest the occasional and cautious use, but do not recommend it as a matter of course. With our home experience of late years in the virtues of the quinia, we are not disposed to accuse M. Maillot of exaggeration, when he assures us that after the bleeding he gave immediately the sulphate in doses of from twenty-four to forty grains in a few ounces of water; and that the symptoms were found to disappear in a few hours "as if by enchantment." Writers in the north of Europe, or in our own Northern States, might be disinclined to credit the astonishing results of this kind of treatment, by the disappearance of symptoms, from which recovery would seem almost impossible. In one of M. Maillot's cases, it was of the *comatose* pernicious form of fever, a hundred and twenty-eight grains of sulphate of quinia were given in a few hours. On the third day from the admission of this patient into the hospital there was complete apyrexia, and on the fourth he was convalescent. The patient was also bled twice; and the importance of bleeding from the arm, followed by opening the temporal artery, was found to be extremely efficacious, and most so in the comatose form. Persons newly arrived from the north, with a retention of their fulness of habit, and as yet abundant and rich blood, and who are seized with this fever for the first time, ought to be bled freely; but in those who have been enfeebled by long residence in a sickly country, or by previous disease, the latter was the case with my comatose febrile patient, we ought to be more reserved in the use of the lancet, and not mistake toleration of the remedy for positive benefit from its use.

It appears, also, that blisters and sinapisms were applied in many of M. Maillot's cases; the first preparatory to the introduction of the sulphate of quinia by the blistered surface, when, as in the cholera form, the medicine could neither be swallowed nor given by the rectum. It would be advisable to apply either blister or sinapism to the spine, under the view of the pathology of intermittent fever already detailed. Opium was combined with the quinia in the African fever. I have already advised this combination, which is used by some of our practitioners at home. M. Maillot has given it to the extent of ten grains in the course of the day.

The *algide* form is, as may be supposed from the description which has already been given of it, that in which the danger is the most imminent, and the necessity for vigorous practice the most urgent. M. Maillot gives a case in which forty grains of sulphate of quinia and two drachms of ether were administered in four ounces of water, at two doses, in the course of an hour: a starch-

opiate injection, with sixty grains of the sulphate and two drachms of ether, was ordered at the same time; sinapisms to the legs, and a blister to each thigh. Under this sharp practice the patient began in a few hours to recover warmth, and the heart to act more forcibly; but the next morning the amendment was so slight, that a sinapism was applied to the whole length of the spinal column, and a lavement given with sixty grains of sulphate of quinine and three drachms of ether: strong reaction then took place, and recovery commenced. (*Op. cit.*)

Before concluding, I have yet a few words to say on the employment of calomel alone and in conjunction with sulphate of quinia in congestive fevers. Regarding it as a depressing medicine of no small power, you will give calomel in the exacerbation of fever as a simple febrifuge, without measuring its effects by its incidental purgative operation, and certainly without blindly urging its repetition until it produces ptyalism. As the best febrifuge effects of tartar emetic are not obtained when it vomits or even nauseates, so neither are those of calomel to be sought for from its purging. If you are persuaded that in the remission there is still irritation, calomel may be given, and if its action be of the nature which I have explained this medicine will be of service. Annesley claims it as an antiperiodic in the fevers of the East Indies; and although not at all comparable to bark or quinia in this respect, both on account of its inferior effects on the nervous system and its tendency to interrupt the nutritive process, it is at times worthy of trial. It is now several years since I noticed the harmony of action, in intermittent fever, between mercury and bark, and prescribed the two medicines accordingly, in the manner mentioned in my remarks on intermittent fever. I have said in another place, "Not unfrequently, when the disease prevailed so extensively in this city and its vicinity a few years ago, I gave a five-grain pill of the blue mass at night and the cinchonic preparations during the following morning, with the effect of promptly arresting quotidian fevers, which had not yielded to the bark alone. The practice is equally applicable to tertian fever." I find that many physicians in the south and west are in the habit of prescribing calomel and quinia in combination, in the congestive or malignant double tertian fevers of those regions. Dr. Drake, in a passage which I quoted from his journal, adverts to it in terms of approval. Dr. Hogg, in his account of the epidemic fevers of Natchez in the years 1837–'8–'9 (*Western Journal*), takes brief notice of the malignant double tertian, and mentions the calomel and quinine practice in the following terms: —

"Whenever the action began to decline, full doses of quinine every second or third hour, alternated with ten-grain doses of calomel, with sinapisms of mustard to the extremities, prevented a return of the chill and torpor. The medicines were then continued in small quantities, and at long intervals, until the secretions became natural and the patients convalescent. The following is my mode

of administering the quinine: — ℞. Sulph. quin. grs. x., Pip. nig. ol. gr. i. M. ft. pil.: one to be taken every hour, or once in two hours.

"When the patient was not seen before the second chill, the extremities were dry and cold, stomach very irritable, contents of the bowels liquid; a warm mustard, pepper, or salt bath, or mustard sinapisms to the stomach and extremities, blisters, quinine, as above prescribed, alternated with calomel twenty grains, sulph. morph. 1-6 grain, together with warm stimulating drinks, seemed to snatch the patient from the jaws of death, and relieved him, contrary to the expectations of friends, or physician. Injections of strong salt water were used to empty the bowels when necessary."

LECTURE CII.

DR. BELL.

REMITTENT FEVER.—Resemblance between this fever and intermittent and congestive fevers—Causes of remittent fever—Modes of termination—Varieties of—Progress and conversions of one into another—Modifying circumstances—Remitting continued or inflammatory fever—Hillary's description of—*Treatment.*—Bilio-inflammatory remittent—Described by different authors—*Treatment.*—Congestive remittent—Clark's description of—Treatment analogous to that of congestive intermittent—Nervous variety or complication—Symptoms—Treatment—Remittent fever complicated with liver disease and with bronchitis and pneumonia—Organic lesions—Great mortality from remittent fever.

THE resemblance in many respects between simple and congestive intermittents and remittent fever, is sufficiently manifest to allow of my referring you to what has been already said respecting the causes and visceral complications of the two first varieties as applicable in a great measure to the last. If I refuse assent to the miasmatic origin of intermittents, *à fortiori*, I feel myself disinclined to admit it of remittent fever. This latter, the more violent and dangerous of the two, ought, according to the miasmatic doctrine, to be the product of a larger evolution and larger quantity of the alleged poison than its kindred fever: but how does its earlier appearance in the season and before vegetable decay has made much progress, or indeed hardly begun, comport with this hypothesis? Remittent precedes intermittent fever in the annual circle of diseases of endemic origin: it follows the high heats of summer in temperate climates, and is even the most frequent as it is nearly the most unmanageable disease in tropical latitudes. Alternations of great solar heat and relative coolness and moisture are the prime conditions for the appearance of the remittent fever, whether it occur in Flanders, or in Hungary and Italy in Europe; or Bengal or Java in Asia; or in Virginia and the Carolinas or in the West Indies, in our own hemisphere. "The great sickness," says Pringle, in his work (*Observations on the Diseases of the Army*), "commonly begins about the middle or end of August,

whilst the days are still hot, but the nights cool and damp, with fogs and dews; then, if not sooner, the dysentery prevails, and though its violence abates by the beginning of October, yet the remitting fever gaining ground continues throughout the rest of the campaign, and never entirely ceases, even in quarters, till the frosts begin." Home, in his Dissertation on the Remittent Fever of Flanders, makes similar observations on the extremes of temperature, and of dryness and moisture (*Bell on Miasm, op. cit.*). But if we pursue our inquiries, we find that these alternations of temperature with moisture are powerfully aided by other deteriorating agents in operation at the same time. Labourers in the field, soldiers in a campaign, and newly arrived emigrants, are the greatest sufferers from remittent fever. The continued action of high solar heat from day to day is itself a powerful exciter, not only of the nervous but of the bloodvessel system, and cannot fail after a time to produce an effect on the blood as well as on the capillary tissue, which becomes less able in consequence to resist the sudden impression of cold and moisture. These are made much more effectual causes of disease if acting on the system of men who have been marching or working all day, and who are greatly fatigued in consequence. How much more prone will such persons be to fever if they are weakened by the over-excitement of ardent spirits or other intoxicating drink, or by the want of excitement of proper food. Dr. Clark, who is an advocate for the miasmatic origin of remittent fever, admits however, very distinctly, that it may occur at any time in hot climates, at sea as well as on shore. He gives a history of its symptoms "as it appears at sea, where it is not affected by exhalations from the land." (*Observations, &c.*) Besides "moist air after long continued heat and exhalations from marshes or damp grounds," which he regards as "the most common remote causes of the remittent fever," Dr. Clark mentions some others which predisposed to the disease, and seemed to have a powerful effect in rendering it more dangerous. "These are principally too great inanition; too great repletion from a diet of animal food; fatigue in the heat of the sun; and the dejecting passions of the mind." When speaking of the powerful influence of fear in bringing on an attack of fever, this author very frankly admits, in explanation of the sudden deaths of those who had attended the funeral of deceased friends at Bengal, "for if the sickness, as some have imagined, had been merely occasioned by exhalations from the marshy burial grounds, or putrid *miasmata* from the adjoining graves, the gravediggers would have been more subject to an attack than the attendants at the funeral. This, however, was not the case; for it generally happened that the timorous and humane suffered, whilst the hard-hearted and callous escaped."

The dependence of remittent fever on atmospherical distemperature is manifested in its approach to a continued fever in the height of the summer, and to an intermittent in the decline of the season; and from the circumstance alone of the time of its appearance

will our prognosis of its duration and intensity and unmixed nature be greatly influenced? In the former case authors have applied the term remittent continued to the fever, which, a little later in the season, is called remittent. To causes of a similar nature, as the predominance of particular winds, the continuance of moisture with heat during the day; and perhaps still more, the personal predisposition growing out, mainly, of particular habits of regimen, must we look for an explanation of the varieties of remittent fever laid down by systematic writers, — such as the *mucous*, the *gastric*, the *bilious*, the *inflammatory*, and the *putrid*. Pringle describes it under the term bilious autumnal intermitting and remitting fevers; and distinguishes these as they appeared either in the camp or in low and marshy places. Needless refinements and attempts at distinction have been made in describing remitting fever, the chief phenomena of which, whether we may choose to designate it as the *Hungarian Fever*, the *Walcheren Fever*, the *Mediterranean Fever*, the *Carolina Fever*, or the *African Fever*, are nearly the same in all cases. The causes of differences are more personal than local. Thus we may see two persons in a district of country subject to this disease, one of whom just arrived from a northern climate, is young and robust, and hitherto healthy; the other, also, healthy after a fashion, has had his system gradually reduced by climatic influences. Now the fever in the first will exhibit more of an inflammatory character than in the second. The disease of the first will perhaps be called the climatorial bilious or the seasoning remittent fever; that of the last, the country or common endemic fever. The one will assume more the appearance of a continued, the other incline to that of an intermittent type. Between the labourer, continually tasked to his utmost strength, and his employer, whose duty has been hardly anything more than active exercise, there will be a difference in symptoms; the fever in the former becoming much more readily congestive than in the latter. So, also, the drunkard's case will be more complicated than that of the sober man.

Remittent fever, as it is commonly met with in our country, particularly in the south and south-west, has four modes of termination: — 1. In early and complete convalescence. 2. In low continued or typhoid fever, from which the patient may, however, ultimately recover, after a long and tedious convalescence. 3. In intermittent fever. 4. In death. The disease presents itself under three chief aspects: — In the first the symptoms of febrile excitement deducible from, or at any rate closely associated with the lesion of some one of the chylopoietic viscera, are met with. This is often inflammatory and runs its course without many mutations, until either a favourable crisis takes place or the disease end in death. In the second variety there is congestion of some one organ or congestion in all the chief cavities with symptoms of oppression, inequality of temperature and chills without much morbid heat of the surface. In the third the nervous system is much affected, — there are obscure rigors for days before the paroxysm, which is sometimes

ushered in with syncope and followed by delirium with incoherency, dreams, struggles to escape from bed, alternately with stupor or indifference: there is often in this variety great and permanent heat of the skin. But although these varieties should be met with separately in any one year or place, they will also represent differences which you must be prepared to see in the same season; and hence no description, however acurately made out, of one patient, or even class of patients, will give you all the details, or even in some important ones an accurate idea of other cases. We may, indeed, sometimes see one variety in the ascendant in the early part of the season, and another variety in the latter part. So, also, in high plains and hills the simple or inflammatory variety will occur, and in alluvial soils on the banks or embouchures of rivers the congestive; but a change in the character of the seasons, as of rain with heat in the uplands, — and an unusually prolonged dry summer in the low grounds, will cause a corresponding change in the fever; the inflammatory or remittent continued occurring in the latter and the congestive variety in the former situation. Even in the same house at the same time, a physician may be required to prescribe for three men, whose cases will exhibit examples respectively of the inflammatory, the congestive, and the nervous, — the differences depending on age, temperament, constitution, prior habits of life, and of bodily or mental exercise. Without a knowledge of these circumstances you will be frequently puzzled at the apparently contradictory histories of the symptoms and march of remittent fever, as well as of the remedies employed for its cure; instead of learning from each writer hints and directions which will be applicable to cases that may afterwards come under your own care. Of all the writers on the Fevers of Hot Climates, Dr. Robert Jackson best prepares us, by his description of the varieties and the circumstances under which they occur, for a due appreciation of the difficulties we may be expected to encounter in actual practice among this numerous and formidable class of diseases. Works like his, and the remark may be extended to several others whose names I introduced to you when treating of congestive fever, furnish more copious and available knowledge than will be found in the more elaborate, but at the same time speculative, at any rate disquisitional compositions of city teachers and practitioners, whose personal experience in the variety of fevers now under notice is very slight, and who illy make up for this poverty by exuberant details of pathological anatomy, not always in strict relation to the subject matter at hand. In fact, just now there is some danger of our forgetting that it is the living not the dead body that we are called upon to study, and that the practice of medicine is something more than the natural history of disease. In our zeal for counting symptoms is there not a danger of our forgetting to devise the appropriate means of obviating and removing them? Ridicule may attach to more calculators than the celebrated Welsh arithmetician, whose criticisms on the acting of Garrick in the part of

Hamlet consisted in telling just the exact number of words which the actor spoke. The pathognomy of disease cannot be reduced to a part of the science of numbers, any more than physiognomy can be taught through geometry, nor physiology through chemistry.

The highest grade of remittent fever is that which, by a contradiction of terms, Hillary and some others call remitting continued fever, or *synochus*. It is ushered in by chilliness rather than rigors, which is soon succeeded by great and diffused heat, pain in the head and back, and sickness at stomach, manifested in frequent retching and vomiting, so that neither drinks nor medicines can be retained. The pulse is usually frequent and full, in some hard and tense. The patient is restless, almost continually tossing and tumbling about, and procuring little or no sleep; or when this comes on it is disturbed and unrefreshing. In some the heat of the skin would yield to a moisture and a fine breathing sweat: others again had cold clammy sweats, especially at the limbs, although there was great heat about the precordia. The tongue is furred and yellow, thirst intense. This form of fever usually abates once in twenty-four hours, at a particular time, but there is no distinct remission, After a certain period it is renewed with its former violence, accompanied as before with vomiting and headache. About the fourth or fifth day it begins to abate, and generally, says Hillary, disappears at the ninth day. I have had cases of this variety of fever in Canton, had seen them frequently in Virginia, and occasionally have met with them in persons arriving in this city from the country. It is not always, however, that we are so fortunate as to procure a cessation of the disease in the time mentioned by Hillary. In some cases the fever scarcely abates, nor is the pulse diminished in volume and frequency for two or three days, after which time, however, there is a distinct remission, which may end in complete apyrexia, but more commonly is succeeded by fever. The disease now assumes a more evident remitting character, and maintains it to the close. Often, after a week's duration, an obvious difference is felt and noticed by the patient himself in his feelings and in the violence of the fever on alternate days.

The chief subjects of this variety of fever are the young and the robust, those of a full habit and athletic frame, or of a sanguine temperament, and who are new comers from a healthier and warmer climate. The *treatment* of such cases is generally simple, and consists in a full venesection, to be repeated if the symptoms of disorder in the head and stomach are still considerable; laxatives and saline draughts, or neutral mixture with a minute proportion of antimony. If during the first day of the disease the efforts at vomiting be great and some bile be discharged, warm water or warm camomile tea, or a little warm salt and water, may be drunk to encourage farther evacuation, and also to procure what a mild emetic of ipecacuanha so often does, an entire cessation of the retching and vomiting. Calomel alone, to be followed by salts and senna, or if the stomach can retain it, combined with rhubarb, will procure large

fecal evacuations, and give great relief. But from frequent purging we cannot expect much benefit. Determination to the head, stomach or liver will be better obviated by local bloodletting and cold to the part externally, and the use of small doses of tartar emetic with some saline by the mouth. Cold drinks slightly acidulated, cold to the epigastrium, and enemata of cold water, will contribute more to the reduction of the febrile heat and to settle the stomach than the various anti-emetic and febrifuge mixtures so commonly recommended.

Under the influence of prolonged heat and unfavourable situation, remittent fever, while it still retains its inflammatory character, assumes the appearances often of derangement of the biliary apparatus, with a yellowness, or discoloration approaching to yellow colour, of the skin, constituting the *bilious* or *bilio-inflammatory* variety of remittent fever. The chief seat of the disease is in the stomach and duodenum, with the inflammation of which the brain greatly sympathises; and hence, in addition to the vomiting, violent pain in the stomach and back, there is often excruciating headache, most felt in the supra-orbitar region, and delirium. Here the more obvious stage of high excitement soon runs into one of debility and great prostration. This variety sometimes becomes epidemic in unhealthy situations, and attacks all classes: it is that kind to which Europeans, who have not been long enough in tropical regions to be acclimated, are most subject; it is also met with in armies during a campaign or when encamped in unhealthy situations in the latter part of summer. The fever described by Bartholinus, which occurred at Copenhagen in 1632, in the autumn after an unusually hot and dry summer, was of this nature. It was accompanied either with quotidian or tertian paroxysms, with bilious vomitings, or burning heat, violent headaches, often with a delirium, and with petechial spots which came out in the fits and disappeared in the remissions. (*Pringle, op. cit.*) In many of its symptoms and in the lesions observed after death, such as inflammation and mortification of the stomach and duodenum, as described by Bartholinus, we recognise a resemblance of this fever to the American yellow fever. Of the same nature as this bilious remittent were, it has been supposed, the plagues, mentioned by Livy, which committed such devastation at different times in the Roman territory during the earlier period of the republic. The bilious remittent noticed by Pringle and other army surgeons at the time among the British troops in Flanders was of the variety now under notice. The remissions usually appear from the beginning, and especially, according to this writer, if the patient is bled in the first attack; sometimes they are little perceptible for the first two or three days. Costiveness not only often precedes but accompanies the disease, and when that happens the abdomen is hard and the patient suffers from flatulency.

The *treatment* of bilious remittent or bilio-inflammatory fever is analogous to that of the simple inflammatory already described, with this important reservation, that we cannot bleed with the same

freedom nor frequency in the latter as in the former. In general, venesection to an extent short of syncope, when had recourse to early in the disease, will precede other remedies; but if we look for a solution or even material curtailment of the disease by this means, we shall be greatly disappointed. The pulse is readily reduced by venesection, but it soon recovers its morbid character, and shows that it does not represent simple vascular excitement. Were we even assured that gastro-enteritis and associated disease of the brain and meninges were present in every case of the fever, we could not hope to remove them by copious general bloodlettings. To prevent disorganizing inflammation, and allow time for the tissues to recover gradually their normal state, and the nervous and vascular systems to be correspondingly tranquillized, is all that we can expect by any mode of treatment in this fever — may I not add of all fevers, however strong may be the evidences of inflammation associated with them. Accordingly, after a tolerably full venesection, we must rely on topical depletion, by cups or leeches, for the relief of the head and stomach; cold to the head; sinapisms and other counter-irritants to the lower extremities; cold drinks, if craved by the patient, and purgative enemata. The stomach and upper bowels ought to be spared the irritation of either emetics or drastic purgatives; but we are not on this account to deprive ourselves of the soothing and sedative effects of calomel in doses of five grains with a little gum arabic every four hours. If sickness of stomach or nausea follow its use, we need not worry and irritate the stomach with the aromatics, or cordials, or even effervescing draught, but give merely a few spoonsful at a time of tolerably thick gum water. If the patient feels some inclination to go to stool or movements in his lower bowels, showing that the calomel has passed downwards, a simple enema of salt and water will suffice to procure a bilious evacuation; which is an evidence, not a cause, of relief. I repeat that active purgation should be avoided; but yet, and as part of sedation, that calomel may be administered in the manner already directed. Nor would I recommend salivation, but on the contrary that it should be deprecated. Calomel performs often its best services without causing either purging or ptyalism. It abates vascular excitement and febrile heat, causes a cool and soft skin and moist tongue, no unimportant indexes assuredly of the relief to the gastro-intestinal canal and chylopoietic viscera generally. Opium, withheld until venesection or cupping and leeching and calomel have reduced inflammation and febrile excitement, and brought about longer and more distinct remissions, will now display its proper soothing and hypnotic effects, by inducing sound and refreshing sleep, and completing the beneficial operation on the skin and capillary tissue in general which was begun by the calomel. This last medicine is safe and proper, and usefully given during all that period of fever in which the system is said not to be affected by it; that is, during the time when it fails to salivate. So soon as we have the slightest evidence of incipient ptyalism, then ought we to

desist from its use. We have now procured its appropriate sedative and counter-stimulating effects, and a reaction, owing to inflammation of the salivary glands, cannot but be injurious, and more or less subversive of the good already accomplished.

The *congestive* form of remittent fever to which I next direc your attention, is the most common and least manageable of all the varieties of this disease. In a more intense degree it constitutes the *malignant* remittent of authors, and bears a close affinity to congestive or malignant intermittents. Proceeding in fact from similar external causes, and internal visceral congestions, the two fevers cannot well be separated for all practical purposes. Thus, we have congestive remittents ushered in at times by syncope, or sopor and insensibility, or violent delirium, as you have learned was the case in congestive intermittents. You see the same febrile reaction more or less complete and violent, and terminating in a similar crisis; and, I may now add, that you can obtain the same salutary restoration to health of the patient, from the very jaws of death, by the liberal and early use of quinia, that has been so often procured in cases of congestive intermittent. A good picture of congestive remittent is given by Clark, in "A Description of the Marsh Fever which raged at Bengal in the year 1768." (*op. cit.*) I transcribe it for your use in preference to some more recent accounts.

"This fever attacked in various ways; but commonly began with rigors; pain and sickness at stomach; vomiting; headache; oppression on the præcordia; and great dejection of spirits. Sometimes, without any previous indisposition, the patients fell down in a deliquium; during the continuance of which the countenance was very pale, and gloomy. As they began to recover from the fit, they expressed the pain they suffered by applying their hands to the stomach, or head: and, after vomiting a considerable quantity of bile, they soon returned to their senses. Sometimes the attack was so sudden, and attended with such excruciating pain at the stomach, and so great a degree of timidity and faintness, that I have been obliged to give an opiate immediately.

"In whatever form the disease appeared at first, the pulse was small, feeble, and quick; the pain of the stomach increased; and the vomiting continued. As the paroxysm advanced, the countenance became flushed, and the pulse very quick and full. The eyes were red, the tongue furred, the thirst intense, and the headache exceedingly violent. A continuance of these symptoms soon brought on a delirium, in which the patients were very unmanageable; but a profuse sweat breaking out in twelve or thirteen hours generally mitigated all the symptoms.

"In the remissions, the pulse, which before was frequently 130, fell to 90: the patient returned to his senses; but complained of great debility; sickness at the stomach; and a bitter taste in the mouth. This interval, which was very short, was succeeded by another paroxysm, in which all the former symptoms were much aggravated, particularly the thirst; delirium; pain at the stomach,

and vomiting of bile. The breath and sweat, even so early as this, sometimes began to be offensive.

"If the disease was neglected, in the beginning, the remissions now totally disappeared; and the skin became moist and clammy. The pulse was small, and irregular; the tongue black, and crusted; and the pain at the stomach, and vomiting of bile, became more violent.

"When matters arrived to this pass, all the excretions, but especially the stools, were very offensive, and ran off involuntarily: and the patients now, instead of being highly delirious, laboured under a coma, with interrupted ravings. Convulsive twitching of the tendons, tremors, and hiccup, were added: the extremities grew cold and were covered with livid vibices; and the body, for several hours before death, very frequently emitted a cadaverous smell.

"The appearance of the urine, in fevers of warm climates, is not much to be depended upon. In the beginning of the paroxysm, it is pale; at the height, of a higher colour; but seldom or never deposits any sediment.

"If the fever was neglected at first, it generally proved fatal betwixt the third* and seventh days. In some cases, indeed, where the exacerbations were not severe, it was protracted to the fifteenth, and sometimes to the twentieth day. But consequential diseases of the liver, terminating in suppuration, and the dysentery, attacking patients in the convalescent state, proved more fatal than the original disease."

More will not be required of me in this lecture, nor is more necessary, than to sum up the leading points of treatment, as they have been already presented to you, for the cure of congestive or malignant intermittents. These are, moderate but assiduous friction, and mild counter-irritation with the warm-bath during the stage of depression; a mild emetic if the state of the stomach seems to call for it, or a stimulating purgative enema. After reaction and during the febrile reaction — to relieve the organs, which are oppressed, by small venesections, or, preferably, by local depletion, and the administration as a sedative and febrifuge of tartar emetic, in doses as large as the stomach will tolerate without nausea, combined with opium. If the temperature of the skin be greater than natural, and especially if the heat be of an acrid kind, the cold

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* "I was informed by a surgeon, who resided at Calcutta, that there were many instances of patients being carried off highly delirious in the first fit; but that he still lost more in the third paroxysm. His practice was to exhibit an emetic at first; and afterwards to endeavour to bring the fever to remit by antimonials and saline draughts. Here, the danger, in the first paroxysm, seems to have been too great to admit of a cure by the most powerful medicines; but the fatality, in the third, might certainly have been obviated by an early exhibition of the bark."

dash or cold affusion is refreshing and salutary. A common and alarming symptom is a burning heat of the abdomen, with extreme thirst and dry and furred tongue, and yet the extremities cold and the skin clammy. Under such circumstances cold to the abdomen and enemata of cold water will be one of the best means of equalizing warmth and excitement, and of reviving the patient from the stupor which is often present at the same time.

But the remedy to which we must look for enabling us to save our patient so soon as there is a remission, is the sulphate of quinia. We need not, indeed must not, wait for all the commonly prescribed conditions previous to administering this medicine, such as moist tongue, soft skin, and pulse approaching to its natural frequency. So far from waiting for a perfect remission, you will be often required, if, when you see your patient for the first time, he has already had several paroxysms of the disease, and is greatly and dangerously reduced by preceding attacks, to direct, or give yourself, the sulphate of quinia, at once, whether there be remission of the paroxysm, delirium or stupor, a frequent pulse or a slow pulse. The operation of the quinia will be quickened and strengthened also by uniting with it a portion of opium; so that the patient shall take ten grains of sulphate of quinia and a third of a grain of opium, or better still, ten drops of laudanum every hour until four doses are taken. Safety may sometimes require the administration, at once, of twenty grains of sulphate of quinia and thirty drops of laudanum. If circumstances call for the use of the quinia during the time of febrile excitement, calomel will be a useful adjunct, more especially in that state which Dr. Rush used to call one of suffocated excitement, in which the system was oppressed by slow inflammation of one or more organs. By this combination we abate both the irritation of the digestive mucous surfaces and of the nervous system at the same time. Clark and Lind, and others, had no hesitation in giving bark during the exacerbation of the fever in hot climates; and certainly the practice is safer, and we may go farther, and say more salutary, in those climates than in colder and northern ones. Much, however, of the decided and positive evils which attended the administration of the bark grew out of the use of spirits or wine at the same time. These latter were regarded as possessing similar properties in a more active degree; whereas, their operation as diffusible and often irritating stimulants was the very reverse of that of bark, and now its salt, the sulphate of quinia. Having so recently discussed this point I shall not now return to it, but would recommend you to make it your study, as involving considerations of great practical moment.

The *nervous* variety of remittent fever is rather a sequence to one of the preceding varieties, or a complication in which the brain is the organ that chiefly suffers. Sometimes the stupor and nervous debility manifested at the beginning continue throughout, but in by far the larger number of cases these supervene on a stage of reaction and imperfect remissions. Masking as they do the excite-

ment of the vascular system, and making the patient insensible in a great measure to lesions of the gastro-intestinal mucous membrane, or of the liver and spleen, they render the diagnosis much more difficult. Hence, in such cases our investigations by every means must be made with unusual care, so that we may ascertain, if possible, the precise condition of the brain and its meninges, and how far there is abdominal disease coexistent. Any suspicion of encephalitis or arachnitis will suggest the application of cups or leeches to the temples and nucha, and according to the effects or degree of reaction shall we be induced to repeat them. Knowing how often the brain is affected secondarily by intestinal accumulation and some congestion even in the portal circulation, it will be our aim to empty freely and completely the bowels, and to abate vascular excitement of the mucous membranes by leeches over the epigastrium or the iliac regions. But while thus engaged in watching and removing morbid inflammation, let us not be blind to the state of the nervous system as measured by its own symptoms, nor be backward on the appearance of the remission, however indistinct, to administer full doses of sulphate of quinia in conjunction with opium. The great depression of mind and despair of living which accompanies this variety of remittent fever, have been noticed by most writers on the disease. Unhappily the augury of the patient in these cases is too generally fulfilled.

The other and more common variety of nervous complication is met with after the fever has lasted for two or three weeks, and no distinct and lengthened remission has been procured, or if it supervened it was neglected, and the patient falls into a state of half stupor and muttering delirium. The eyes are muddy, the face is of a murky-red or bronzed hue; the tongue dry, parched, and chapped, and either red and shining, or loaded with a yellow-brown, dried mucus and saliva, which also coat the lips and teeth. The pulse is very frequent, skin, particularly over the abdomen and head, of an acrid heat; the bowels either loose or obstinately constipated, urine in small quantity, high coloured, and, at times, of an offensive smell. This nervous is quite a common termination of bilious remittent fever both in white and black subjects, as I often witnessed it in Virginia, and in this city during the prevalence of intermittent and remittents in the suburbs and country around in the years 1822 and 1823.

The treatment of this stage of the fever, usually designated as *typhoid*, whether in the country it has since acquired another name I cannot say, ought to be a good deal expectant. The common routine practice consists in the use of camphorated mixture with sweet spirits of nitre and carbonate of ammonia; bark, now sulphate of quinia in its place, an occasional laxative, or a laxative enema. Commonly also blisters to the nucha, and to the lower extremities, and the free use of wine or warm spirits and water, were prescribed with a view of rousing the system from its state of torpor and stupor. I never saw a case shortened in its period by this treatment,

nor do I think that it materially mitigated the state of any suffering organ: but, on the other hand, it often, I know, aggravated the disease. On one occasion in Virginia, I remember, in the case of a little black girl who had been three weeks sick with fever, and during the greater part of the time in this low typhoid state, I took away a few ounces of blood. The effect was immediate and most salutary: from that moment convalescence began and soon ended in entire restoration to health. I gave also laxatives of calomel and rhubarb, and of rhubarb and magnesia. In some cases which I have had to treat in this city I have relied most on cold affusion of the epigastrium, frictions, sinapism to the extremities when they are cold, enemeta of tepid water to regulate the bowels, gum water or barley water acidulated with elixor of vitriol for drink, arrow-root or panada flavoured sometimes with wine, for food; occasionally a few grains of calomel, and so soon as any remission could be perceived, full doses of the sulphate of quinia. I ought to have said that I sometimes directed leeches to the temples or the epigastrium, or the iliac regions, according as there were evidences of undue determination or vascular excitement in the brain, the stomach, or the ileo-cœcal portion of the intestinal canal. Among the most frequent and embarrassing complications of remittent fever, in our climate, is bronchitis. Its treatment has been laid down when the modifications of this latter disease were under notice.

The liver is greatly and often implicated in remittent fever. Mr. Twining makes frequent mention of the fact in describing the fever as it shows itself in Bengal. Dr. Davis, in his account of the morbid appearances found in the bodies of those who died subsequently to their return to England from the Walcheren expedition of 1809, states that the liver was generally loaded with blood, and the portal system obstructed. In some instances the liver was of a gelatinous consistence. Portions of it taken between the fingers could be squeezed to a substance resembling in appearance grumous blood. A similar state of this organ is met with in the congestive remittents and intermittents of Italy, as I have noticed in a preceding lecture. Dr. Stewardson, in two papers on "*Remittent Fever*" in the *Amer. Jour. of Med. Sciences*, 1840 and 1841, whilst tracing with great care and judgment the phenomena of this disease as it was presented to him during his attendance on the Pennsylvania Hospital, takes occasion to point out, in a very particular manner, the morbid condition of the liver in those dead of the fever. This organ was found to be constantly diseased, exhibiting a bronze colour bordering upon olive, and internally a cut surface of the same colour: the two substances, cellular and vascular, of the liver were merged into one.

The spleen is also organically diseased in nearly all cases of remittent fever. The observations on this head are constant and uniform, in whatever region the disease may have prevailed,—Bengal in the East, or the region of the Chesapeake in the West. The tumefaction of the spleen occasionally comes on very suddenly,

as we learn from Mr. Twining, in the course of remittent fevers in Bengal; and in a few days the enlargement can be seen as well as felt, extending far between the cartilages of the left false ribs. The engorgement of the spleen Dr. Stewardson noticed to be constant in the cases of remittent fever in the Pennsylvania Hospital, "and not altogether similar to the engorgement of the organ met with in other diseases."

The stomach, as might be expected from the frequency and persistence often of gastric irritability during the progress of remittent fever, is frequently, we may say generally, inflamed in this disease. M. Boyle (*A Practical Medico-Historical account of the Western Coast of Africa, &c.*) tells us that the stomach is generally the principal seat of diseased action in the local or endemic fever of Western Africa, whether gastric derangement be evidently present or not. The inflammatory appearance he describes to be chiefly confined to the lower portion of the stomach; and in the generality of cases extending through the pyloric orifice, and rarely failing to occupy a small portion of the duodenum immediately around the entrance of the *ductus communis choledochus* into the intestines,—that duct being ordinarily nearly impervious, or choked, as it were, by dark-looking, thick, viscid bile. How closely resembling is this description of the morbid appearances of remittent fever in Africa with that of Bartholinus's nearly two centuries before in Denmark. It would seem, after all, as if we might still venture to rely on descriptive details of diseases and the lesions of organs produced by or accompanying them, made by our old fashioned observers, even although they did not talk so largely of numerals nor claim or insinuate a superior knowledge of disease on the strength of having counted, but without repelling or mitigating its ravages. Dr. Stewardson reached similar conclusions with his predecessors in this matter, when he found the stomach so much more frequently presenting the ordinary characters of inflammation "than in other fevers, if we except yellow fever." He gives more anatomical precision, when noticing the morbid state of the duodenum, by his pointing out a remarkable development of the glands of Brunner in this intestine. Dr. Richardson, reporter of some cases of remittent fever in the New York Hospital, under the care of Drs. Smith and Johnston, carries us a step farther in our intestinal pathology, by showing, as the results of *post mortem* examination, an enlargement and, in some cases, ulceration of *Peyer's glands.*

The special pathology of remittent fever may be summed up in the following language of Dr. Clark, already so often quoted, and who wrote about eighty years ago. "And no person can visit patients under remittent fevers, especially in hot climates, but must be convinced, from the burning heat, and the constant pain and vomiting, that some degree of inflammation in the stomach, duodenum and liver, often appears early in the disease, which, if not speedily removed, too frequently proves fatal." Next to the abdominal viscera, the state of the brain in remittent fever merits our

attention, and we cannot understand or properly remove the entire series of morbid phenomena caused by its disorder, without a study of this nature.

Putting aside, then, the varieties of remittent fever, and fixing our attention on the most constant symptoms, as evidences of the organs primarily and chiefly diseased, we are led to the antiphlogistic practice consistently carried out in the first stage, and opium and quinia in the second. By consistent antiphlogistic practice I understand venesection at first, then cups or leeches over the epigastrium or the right or left hypochondrium, or to the head, according as the stomach, or the liver, or spleen, or brain, is believed to be especially the seat of inflammation, and afterwards calomel and castor oil, laxative enemata, cold drinks and cold water otherwise used as already prescribed, to the avoidance of resinous or other purgatives, or any especial purging at all, with a view of emulging an inflamed liver and amending the quality of the bile. Opium, following depletion, in the shape of Dover's powder, in five-grain doses, repeated every four hours, or if the stomach be very irritable, laudanum injection, will allay the pain and distress of the head, and procure tranquillity and sleep; after which sulphate of quinia, early and freely administered, will complete the control of the irritation of the nervous system, by preventing paroxysmal returns and their concomitant congestions. I conclude the series of medical testimony in favour of the early and full doses of quinia in periodical fevers, whether simple or congestive, by adducing the opinion of Mr. Martin (*Topography and Climate of Calcutta*), who believes that if he arrests the paroxysm he does "greatly more towards the cure at large, than quinia can possibly do harm to the local affection — the treatment of which by local depletion and counter-irritants is not interfered with by this means: again, all tenderness on pressure or local pain does not, in the case here stated, necessarily constitute inflammation."

The *mortality* from remittent fever in tropical and adjoining regions is very great. In the West India Islands, during a period of nineteen years, and among the English troops, whose aggregate strength during that period was 86,661, the deaths from remittent fever were 1966. The cases of admission into the hospitals of this disease were 17,799, or more than 1 out of every 5 men; the deaths were about 1 in 9. In British Guiana the deaths from remittent fever were 762, in an aggregate strength of 17,689, during a period of nineteen years (*Report of the Sickness, Mortality, and Invaliding among the Troops in the West Indies*). The reporter says, in speaking of the probable cause of sickness in the West Indies — "The tables illustrating the influence of the seasons on the health of the troops, in each station, show that the greatest number of admissions into hospitals and deaths has, in the average of a series of years, (though not uniformly or equally in each year,) taken place in those months when the greatest degree of heat was combined with the greatest degree of moisture." "The unhealthy character of the

period of the year in which the greatest degree of heat and moisture is combined, is not, however, confined to the West Indies, but extends also to the east as well over a large portion of the northern temperate zone." If we take particular statistics we find, however, that the mortality is still greater than in the preceding estimates. Thus, in Up Park Camp in Jamaica, during a period of nineteen years and in an aggregate strength of 14,520, the deaths from remittent fever were 1727. In Great Britain and Ireland, for a period of seven years, in an aggregate strength of 44,611, the cases from remittent fever were 11, the deaths 1. But in Sierra Leone, in an aggregate command of 1843, the admissions of cases of remittent fever were 1601, and the deaths 739, or nearly 1 death for 2 cases of fever, or 1 death for every 2·4 men of the whole strength. The proportion of cases of remittent fever in the United States army is 1 in 9. (*Forry, op. cit.*) The deaths are not stated.

LECTURE CIII.

DR. BELL.

DIVISIONS OF CONTINUED FEVER—*Synocha—Synochus and Typhus*—Sketch of synocha and synochus—*Typhous and typhoid fever* analysed—Contradictory opinions on the subject—Description of *typhoid* fever or *dothinenteritis*—The anatomical lesions in typhoid fever—Causes—Diagnosis—Treatment.

BEFORE treating of typhous and typhoid fevers, which will be the subject of this lecture, I shall devote a few words to the other varieties of continued fever. The typhous, although the common variety of continued fever in Great Britain and Ireland, is not the representative of all continued fevers. Synocha and synochus are also described as the two other types, — the first being *inflammatory fever*, the next *mixed* or nervous fever. Synocha is both of primary and separate and of epidemical and mixed occurrence; that is, it may appear in solitary or individual cases, or at the same time with other fevers epidemic at the time. It occurred, as we learn from Dr. Christison (*Library of Pract. Med.*), in a considerable proportion of cases of epidemic fever, especially among young adults, both in Edinburgh and in other parts of Great Britain and in Ireland, between the years 1817–20, and likewise, though to a less extent, in the succeeding epidemic of 1826–9. In many instances, however, the disease was not altogether pure. More generally it was attended, in one part or another of its course, with symptoms of local inflammation — most frequently in the chest, occasionally in the peritoneum, more rarely in the larynx, often in the tonsils, seldom in the parotid gland, and very seldom in the head. Such local affections, of which catarrh, pneumonia, and pleurisy, were the most common, did not show themselves till the fever had lasted for a few days; they frequently disappeared some time before the cessation of the febrile symptoms; and they were,

for the most part, very easily removed by general or even local depletion. In a few rare cases the local inflammation went on where the fever was checked. Rheumatic attacks were common during convalescence; but they were seldom attended with any febrile disturbance of the circulation. Cases of pure fever were most frequent in young persons of the better ranks, who were not exposed to the ordinary co-operating causes of local inflammation.

The fever which in our climate most nearly approaches the synocha, is the remitting continued or inflammatory remittent, already described.

Synochus is thus described by Dr. Christison (*op. cit.*) : — This is probably the most frequent of all types and forms of continued fever. It is essentially characterised by the disease commencing as synocha and terminating as typhus. There are scarcely any cases of primary continued fever, which do not present an inflammatory stage of longer or shorter duration, and of more or less violence at the commencement; so that, perhaps, all continued fevers not falling under the purely inflammatory type, might be considered as synochus. But in nosological arrangements, as well as in practice, the term is usually, and in reference to treatment conveniently, restricted to such primary fevers as begin with a distinctly marked inflammatory stage like synocha, lasting for at least a few days, and not giving way to adynamic or typhoid symptoms till the beginning of the second week at soonest. Such was the general nature of the epidemic fever which raged in the United Kingdom from 1817 till eight or ten years ago; and such too seems to have been the *febris bellica* of the Continent, which broke out in the large towns of Germany and other continental countries of Europe in 1814, subsequently to the French war; and of which, indeed, the British epidemic was probably a propagation. Under the same head may be classed most of the fevers described by English authors of the last century, under the name of nervous fever. The most remarkable examples of it which have perhaps been ever seen, occurred in the British epidemics of 1817–20 and 1826–9. For the inflammatory stage was often so well marked, that it was impossible to tell for some days whether the disease was to terminate as synocha, or pass on to the typhoid stage of synochus; while on the other hand, the typhoid characters of the advanced stage were often in those very cases so well developed, that no one, seeing the disease for the first time at this period, would have known from the symptoms that it had ever been anything else than true typhus. In later years the inflammatory stage had become much less prominent; and in the generality of cases, at least in Edinburgh, as well as in other great towns, it has at present almost disappeared, and given place to typhoid symptoms from a very early period of attack.

In describing synochus it seems unnecessary to enter into particulars. The details of the typhoid stage are exactly the same with those which will presently be given under the head of typhus. Those of the inflammatory stage are analogous to what we see in

synocha. In synochus, as in synocha, the fever is sometimes simple, but much more frequently complicated, as in the latter, with local inflammation in the early stage. Later in the disease, when typhoid symptoms are formed, local inflammations and local congestions frequently appear as in typhus, and more frequently than these secondary disorders are observed to show themselves in the early stage. Yet even in the latter stage secondary affections are sometimes absent, so that we have a pure, uncomplicated, primary synochus from first to last. Cases of this nature were clearly observed during the British epidemics above referred to. The most common secondary affections in this, as in the inflammatory form of continued fever, are, in Britain at all events, inflammatory diseases of the lungs — pleurisy, pneumonia, but especially catarrh, often passing into bronchitis.

The passage of synocha into typhus usually takes place, as already remarked, in the course of the second week. It is indicated by the pulse opening up as it were, becoming fuller, more compressible, though still often equally jarring, and falling at the same time somewhat in frequency. The tongue also acquires a brown, dry streak down the centre; the heat is less pungent, while the skin is equally dry; but in particular, the muscular exhaustion increases greatly; the senses from being irritable become more obtuse than natural, especially the sight and hearing; the integuments, from presenting a bright red flush, acquire a dingy, reddish-brown tint, of the nature of congestive redness; and there is a marked tendency to doze, sometimes intermingled with slight muttering delirium. These changes gradually lead on to the state of true typhus in its characteristic form, which will now be described.

Dr. Stokes, in his remarks on the anatomical characters of fever, and the analogy of typhus to small-pox, does not attempt to separate, under two heads, typhous and typhoid fevers, as has been done by some zealous pathologists of late years. These latter tell us that typhous fever is an exanthematous disease, is contagious, and does not leave behind it any uniform anatomical lesion or altered structure of organs: typhoid fever, on the other hand, is not contagious, does not uniformly or characteristically exhibit an eruption, but has, as a constant character, an anatomical lesion, which consists in an alteration, by inflammation and ulceration of the glands of Peyer and Brunner, and inflammation of the mesenteric glands. The initial symptoms of the two diseases differ in the earlier and greater stupor and suffusion of the eyes in typhus. Some of the French pathologists have proposed to designate typhoid fever by its anatomical character, and it is by some called *dothinenteritis, or follicular enteritis.* But a little inquiry will make us backward in assenting to the accuracy of this division, and of the distinctions on which it rests. Thus, it is known that typhoid fever has commonly an eruption, which is stated expressly by M. Chomel to be one of its peculiarities, and to appear between the seventh and ninth days of the disease. *Petechiæ and sudamina* are clearly understood by M.

Andral to be diagnostic symptoms. It is true that the petechiæ of typhoid are chiefly confined to the abdomen and anterior parts of the chest, and they are of a rose colour: those of typhus are for the most part general, and are of a slightly livid or purple tint.

But, as regards the anatomical characters of typhoid fever, we learn from the same excellent and impartial authority, M. Andral, that patients have perished under this fever with all its symptoms well marked; yet still there was no exanthema, certainly no ulcerations nor appreciable alteration in any part of the digestive tube. Can the proposition be inverted, and shall we be told that as there is typhoid fever without dothinenteritis, so there may be dothinenteritis without typhoid fever? This is the fact, since follicular enteritis has been found in other diseases, such as phthisis, scarlatina, remittent fever, diarrhœa, and cholera. It were superfluous after this, to say that this variety of enteritis may go through its stages without giving rise to the phenomena of the fever called typhoid. Indeed M. Louis himself, the strongest advocate for the anatomical lesion of the intestines, as constituting the fixed character of the fever, tells us that headache, which occurs in forty-nine out of fifty cases of fever, is not met with in two out of the same number of enteritis. The rose-lenticular spots, the sudamina, epistaxis, tympanites, so common in typhoid fever, are rare in enteritis. This last disease may occur in infancy; may be repeated several times, and may complicate other diseases; whereas typhoid fever less seldom attacks very young or very old individuals, and does not often appear a second time on the same person.

A few words more on the specific characters of typhus before a fresh comparison between it and typhoid fever is instituted. A belief that typhous fever is contagious and is accompanied by a petechial eruption has been entertained and expressed by most of the writers on the subject, since the beginning of the sixteenth century. The disease has often been designated by the term petechial fever and petechial typhus, although this latter would imply that there are other forms of the fever in which petechiæ are not seen. This was the case in the jail fever of Winchester, described by Dr. C. Smith, to whom reference is made by Wilson (now Philip) in his work on Fevers. The petechial character is more constantly seen in typhous fever when it prevails over a great extent of country, or, as it is termed, epidemically. A memorable example of this form of disease occurred in Italy in the year 1817, a history of which I transmitted in the latter part of that year to Dr. Wistar, and which was published subsequently in the first volume of Dr. Chapman's *Medical and Physical Journal*. In this paper I stated that some writers, among whom was Palloni (a distinguished physician of Leghorn), with Hildebrand and others, considered the petechial typhus to be a distinct eruptive disease, arising from a contagion *sui generis*, like small-pox or measles. Opposed to this opinion were Professors Franceschi of Lucca, and Valentini of Rome, who view the eruption as by no means an essential feature of the

disease; in proof of which it has been remarked, that the eruption is sometimes absent, sometimes papular, &c. Franceschi observed the eruptions only on the inside of the arms and thighs, on the breast and lateral parts of the neck, but never on the face. He says, that petechiæ do not terminate as other exanthematous or acute diseases of the skin, for no desquamation succeeds their appearance, nor do any traces of their presence remain. The eruption is neither critical nor symptomatic; as is shown by the uniform shape of the spots, and by their affording no relief, and causing no detriment when they appear.

There are, it is admitted, no fixed anatomical lesions in typhous fever; although some one organ or another commonly suffers much during the disease, and manifests structural changes after death. I have, already, adverted to the resemblance between the symptoms of *ramollissement* of the brain and those of typhous fever; and I find it stated in a report of cases by Mr. Curling occurring in the *clinique* of M. Louis, that the latter twice mistook this fever for the former disease. Dr. Armstrong states, in his *Lectures*, that he has invariably found the brain and its membranes affected in more than one hundred cases without a single exception.

If we were to institute a comparison between the two fevers, typhous and typhoid, we should find many more points of resemblance than of contrast. Both diseases have commonly an eruption, and both may prevail without any; both are attended by frequent anatomical lesions; the typhoid more constantly and generally with one kind; but both may run their course without any such organic change. In both fevers the digestive and the nervous systems are the most deranged; and in both there occur complications of bronchial and pulmonary disease, and a morbid state of the heart. Typhus shows more frequently the brain, and typhoid fevers the intestines, to be the suffering organ. Softening of the left ventricle is one of the lesions noticed by M. Louis in persons dead of typhoid fever. Now much stress is laid by Dr. Stokes on feebleness of this organ in typhus, and he is greatly guided by the symptoms which it furnishes, in his recommendation of the use of wine by patients labouring under this fever. There still remains one point of broad contrast between the two; and that is in the reputed contagiousness of typhus and the absence generally of this property in typhoid fever. But here, again, there is a nearer approximation than might at first appear. Writers are not entirely agreed respecting the non-contagiousness of typhoid fever; and the warmest advocates of the contagiousness of typhus admit its occasionally spontaneous origin. Dr. Stokes, both by the tenor of his remarks and by his observation in a note to his paper on the use of wine in typhus, obviously regards as lesions in typhous fever the ulcerations of the intestines, which have been assumed by some of the French pathologists to be characteristic of typhoid fever.

These are the opinions which I advanced two years ago on the subject of typhoid and typhous fever. They were expressed in

brief terms, but not hastily adapted. I was, however, not long after criticised for holding them, and it was intimated pretty roundly by one critic that I had better not have spoken on the subject until I had studied it more fully. The rebuke and advice were received in good part, and I have said nothing in extenuation or defence up to the present time. During these two years past many pens have been busy on the question, of whether there is a general sameness between typhoid and typhous fevers, or whether they are specifically different? Now, I must say that, anxious as I am to reach the truth in this affair, I cannot forego the opinion already expressed, even at the risk of fresh censure. It is some encouragement, however, to find that precisely the same conclusions with my own are reached in the *British and Foreign Medical Review* (October, 1841), after two long articles have been devoted to the subject in all its bearings, and a due share of laudation measured out, at the same time, to M. Louis, the apostle of the differential creed.

The question has almost become a national one between France and Great Britain, perhaps I ought to say between Paris and the great towns in Great Britain and Ireland. The Parisian physicians have described, very minutely and very accurately, the form of continued fever with which they are most familiar, and called it the *typhoid affection*, or *typhoid fever*, regarding it as a general or constitutional disease; the chief, and, as they allege, characteristic lesion of which is a marked alteration in the agminated glands of Peyer, and the mesenteric glands. Having thus well and faithfully pictured the state of things at home, they looked on the other side of the channel and intimated that, if their brethren in England would carry their investigations equally far, they would meet with the same internal features, or not to be figurative, the same internal anatomical lesions. Accordingly, Dr. Lombard, a very intelligent and pains-taking gentleman, who had become familiar with typhoid fever, and the anatomical lesions in the small intestines, during his hospital and other experience at Geneva, visited Ireland; and he was so struck with the identity between the symptoms of Irish typhus and the French typhoid, that he had no hesitation in assuring his Dublin friends that they would find the intestinal lesions in the former disease as readily as he had been accustomed to see them at home. But great was his surprise, as you may readily imagine, when he discovered that there was no uniformity between the phenomena of the Irish typhus and the intestinal lesions — disease of the glands of Peyer. Abandoning his first opinion, and with it his numerical method, he all at once discovered that typhus is quite a different disease from typhoid fever, that it is an Irish disease, and that it is identical with the jail and camp typhus of French writers. That this brief summary of Dr. Lombard's anticipations of what he expected to see in British typhus, contrasted with what he did actually see, is critically correct, will appear by reference to the *Dublin Journal of Medical Science*,

vol. x., now before me. He says, in his first letter to Dr. Graves, in that journal, "I affirm, without fear of contradiction, that the symptoms which in Paris and Geneva I have almost always seen in fever, are exactly those which I have seen in this country in the different fever hospitals that I have visited both in Dublin and Glasgow.

"The external appearances are most undoubtedly the same; there is the same headache, pain in the loins, prostration of strength, the same pulse, hot, burning skin, the same depressed expression of countenance, the same furred, dry, parched tongue, and in the latter stages of this disease the same tendency to the formation of bed-sores, and to involuntary discharges of stools. The same pulmonary and cerebral complications take place in both fevers, and bronchitis, pneumonia, determination of blood to the head, and arachnitis, or at least engorgement of the meninges, occur in both."

One inference from this clear declaration by a physician, who, as he tells us in another part of his letter, had been engaged six years in close attention to this subject, of the exact identity of the symptoms of fever which he had seen in Paris and Geneva with those which he saw in the different fever hospitals, cannot be evaded. It is, that no lesion which is not met with in all the subjects of fever in both countries can be distinctive; and if it is found only in one country it cannot give rise to diagnostic symptoms which are common to the fevers in both countries. It is true that, after having said wherein consists "the general similarity," he next points out some of the most obvious differences. The chief of these are the eruptions on the skin, the restriction of typhoid fever to a certain age, or young and middle-aged adults; the extension of typhus to all ages, and the highly contagious nature of this latter, contrasted with the less frequency of this character in typhoid. But as respects the first difference, or eruptions, observers are not by any means agreed; and touching the second, or age, it is now admitted by the Parisian physicians that this fever attacks young children as it has been known to do also old persons. On the score of contagion, it is only the degree that is insisted on by Dr. Lombard, for he says that he "can bring forward undeniable proofs" of "its transmission by contagion of the continued fever of France and Geneva."

At Liverpool, Dr. Lombard, as he informs Dr. Graves in a second letter (*Journal, ut supra*), found on dissection that the morbid appearances bear the same character as those described in Dublin: "viz., serous effusion in the brain, meningitis, pneumonia, and occasionally some injection of the mucous coats of the intestines; as for the ulcerations of the ileum and cæcum, they are occasionally, but by no means constantly met with; their frequency varies with the different seasons." But all the typhus in Great Britain Dr. Lombard regards as of Irish origin and spread by Irish labourers. He now discovers also, that "the sporadic continued fever found in all parts of Europe is also to be found in the different towns of the British empire," and that "this fever is characterised by the folli-

cular intestinal eruptions and by consequent ulcerations," and forms one-third of the total number of cases in Glasgow, a much less proportion in Dublin; one-fourth in London, but varying in different proportions. Dr. Lombard does not give us the *numerals* which serve as the basis of the proportions which he thus summarily creates of the cases of typhoid fever in Great Britain. But the most complete refutation of the not enviable febrile distinction which Dr. Lombard was thus willing to confer on the poor Irish, is to be found in some remarks by the author of a "Twelvemonth's Campaign with the British Legion" in the civil war in Spain. In describing the fatal effects of the epidemic typhus which attacked that body in January, 1836, he states that "the English and Scotch suffered extremely, while the Irish brigade, composed of the 7th, 9th, and 10th regiments, enjoyed a perfect immunity;" and he adds, "had the whole been composed of Irish, instead of losing nearly 1000 men at Vittoria, we might not have lost 100. In spite of all the hardships, the severity of the weather, the badness of rations, and total want of pay, the Irish lived, throve, and grew fat, as if in the midst of clover: such are the advantages of misery and starvation at home:" and again, "the Irish brigade suffered little or nothing from disease, although it was not better off for provisions or quarters than the rest of the force." (Dr. W. J. Geary's *Report of St. John's Fever and Lock Hospital, Limerick — Dub. Jour.*, vol xi., p. 383.)

Dr. Lombard speaks of the identity of English typhus with camp or jail fever; whilst M. Louis regards, as matter of demonstration, the identity of this latter disease with continued or typhoid fever or the *dothinenterie* of Paris. But yet he maintains the differences between typhoid fever and the common English continued fever or typhus.

About the time that Dr. Lombard was performing the medical *jeu de bascule* which I have just described, Dr. Gerhard, whose habits of observation were strengthened by the example and precepts of M. Louis in Paris, turned his attention, among other interesting subjects of pathological research, to that of fever, after his return home. The first fruits of his study and experience in this department were published in the *American Journal of Medical Sciences* for Feb., 1835, in which he demonstrates the perfect identity of the continued or typhoid fever of Paris and our typhous fever here, both as respects symptoms and anatomical lesions. The basis of his calculations was fourteen cases of typhous fever in the Pennsylvania Hospital, in which he was at the time resident physician. Of these, five terminated fatally, and autopsic examination was made in but two. Dr. Gerhard framed a tabular comparison, in columns, between seventeen cases of typhus (typhoid) fever observed by M. Louis, and nine cases of home typhoid fever observed by himself. The result was as just stated,— entire conviction on Dr. G.'s part of the identity of the Parisian fever and our typhus. Soon, however, a change came over his opinions, and in a subsequent paper in the same Journal for Nov., 1836, he announces his belief that the typhous fever which he had had just before an opportunity of studying, in

his capacity of one of the physicians to the Philadelphia Almshouse Infirmary, is the same with that of England, but quite distinct from the continued or typhoid fever of Paris. He grounds his opinion on the differences in anatomical lesions and because "it is very clearly proved that the typhoid fever or dothinenteritis is not contagious." In reply to this last declaration we need only state, that M. Louis is persuaded that dothinenteritis does spread by contagion; an opinion maintained also, as we have seen, by Dr. Lombard, and by MM. Bretonneau, Gendrin, Chomel, and Gaultier de Claubry. Dr. Gerhard, to the reader of his last paper, relieves himself from the appearance of vacillating opinion, by calling those cases ones of typhoid fever or dothinenteritis, which in his first paper he had very explicitly called *typhus*.

I shall not argue the question any farther, by the exhibition of conflicting testimony and revolutions of opinions in the same witnesses; nor do I now adduce them in disparagement, but merely to show that, as there is so much cause of reasonable doubt, some of us may still be allowed to retain our former opinions, either it may be from want of perspicacity on our part, or from the evidence which has wrought change in others not being as yet sufficiently cogent to persuade us. In New England attention has been awakened to the subject of the pathology of continued fever in relation to the Parisian creed. Dr. J. Jackson, of Boston, declares that, since the work of M. Louis has been known to him, he has found that the continued fever so well known in that quarter, is, there at least, the same with that which he (M. Louis) has described. In every case, where an examination has been made, the morbid changes have been found to be the same as those described by M. Louis. Among different sources of information going to show a sameness in the disease in neighbouring places, Dr. Jackson specifies a report of two cases in Lowell made by Dr. Bartlett, now of the Transylvania University. Dr. Bartlett has just sent forth a work on the subject (*Typhoid and Typhus Fever*), which I am safe in saying merits a careful perusal, but I am unable just now, in the extreme pressure of multifarious engagements in addition to preparing these lectures, to avail myself of the information which it contains. I see, however, a reference to the opinions held by the late Dr. Nathan Smith on the subject of continued fever. The views of Dr. Smith must be enforced by constructive commentary if they can be made to bear on typhoid fever, the distinctive traits of which under the present designation have only been attempted to be drawn within these few years past. I remember very well Dr. Smith's explicit declaration of creed on the subject of typhous fever, contained in a note to his edition of Dr. Wilson's (now Wilson Philip) work on Fevers; in which I do not see that Dr. S. indicates any difference between the typhus which he had seen and that described by Dr. Wilson from European writers. In the essay of Dr. Smith on Typhus, first published in 1825, and subsequently, in connexion with other papers,

in a volume (*Med. and Surg. Memoirs*, 1831) now before me, no attempt is made to distinguish the fever which he describes from the common English typhus, and yet some of the symptoms in his essay might be designated as those which the differential school would claim for typhoid fever. He very distinctly contends that, during thirty-five years, he has never seen continued fever in New England which is not caused by specific contagion, such as small-pox, measles, &c., or evidently connected with local inflammation, except typhus. "The latter stage of all severe cases of typhus is attended with diarrhœa, the stools are frequent, copious, liquid, and extremely fetid. The bowels are often tympanitic, the flatus not passing off with the liquid stools." Again, he says: — "I have never lost a patient whose bowels continued constipated through the whole course of the disease, and have never known a fatal case of typhus unattended by diarrhœa." Here are evident symptoms of typhoid or dothinenteritis, some may exclaim; and Dr. Smith has shown that the disease prevailed in former times in New England, as Dr. Jackson and Dr. Bartlett show that it does still. But herein is the dilemma. If we admit the author to know what disease he is describing, can we deny that Dr. Smith meant in the present case the old-fashioned typhus or jail or camp fever; and if so, then must we admit its identity with the typhoid fever, since the symptoms of the latter are identical with those he describes.

Did time allow, I might give you some of the recent literature of this subject; but I am consoled for this inability by the reflexion that the labours of the different writers who have canvassed it in Europe, on both sides of the channel, have not succeeded in clearing away all obstacles to our perfect mental vision. Certainly the differential school has not yet succeeded in making good its position, notwithstanding that M. Louis has, in addition to his own observations, enjoyed the aid of those of MM. Valleix, Forget, Drs. Stewart, Anderson, and others. (See *Archiv. Gén. de Méd.*, 1839, 1840, and 1841, and *Edinb. Med. and Surg. Jour.*, 1838 and 1840.)

Typhoid fever enjoys a wonderful variety of names. *Ileitis*, as examined and explained by Dr. Stokes, is the same disease as the *dothinenteritis* of Bretonneau, the *follicular enteritis* of Andral, the *mucous fever* of Rœderer and Wagler, the *adynamic gastro-enteritis* of Broussais, and the *typhoid fever or affection* of Louis, Chomel, and others. In England and in the United States, it has been commonly regarded as a mere modification of, itself on occasions soon becoming, *typhous fever*. Dr. Stokes, it will be remembered, does not think that the inflammation and organic change are confined to the mucous follicles or muciparous glands; and I believe that he is right, in supposing that the intermediate mucous surface participates in the lesion.

Follicular enteritis, is a term which designates the seat of the inflammation as regards the several component parts of the intestinal mucous membrane; but it does not specify with equal distinctness the region of which it is mainly the seat. This last is the lower

portion of the jejunum, the whole of the ileum, and sometimes the upper portion of the large intestine or colon adjoining. The point at which the follicular alterations begin, is the end of the ileum and the ileo-cœcal valve. From this the lesions advance upwards and towards the jejunum. The anatomical name given to the follicles or crypts in the digestive mucous membrane is, the glands of Brunner and of Peyer. The first serve to designate the scattered follicles in the stomach and duodenum; the second, the glands of Peyer, are in clusters, and arrayed in rounded and elliptical patches in the lower portion of the free surface of the small intestine. In the colon they are found united two and two, and four and four, on both its free and adherent surface. Coincident with alteration of structure of the follicles is that of the corresponding *mesenteric glands*.

The first change in the mucous membrane and follicles noticed, is an exanthema, which is soon followed by an increased opacity of these bodies, seen and readily felt through the distended and almost transparent intestine at various parts along its course: the succeeding stages are, partial, then entire ulceration, and when convalescence takes place, cicatrization. Ulceration is common in the glands of Peyer; more rare in those of Brunner. The number of affected Peyerian patches varies from one to twenty or thirty. Another, and more fatal termination, is by perforation of the mucous membrane, and consequent partial exposure of the peritoneum: resolution may occur, and is of course favourable. There is not any positive relation, in regard to time, of these stages, one to another. Sometimes ulcerations of the follicles have been seen in the bodies of those who have died a few days after the invasion of the disease. In other cases, again, a simple exanthema, only, has been found in persons who had died at a more advanced period. In ninety-two cases closely observed by MM. Louis and Chomel, the ulceration commenced at from the eighth to the twelfth or fifteenth day from the first attack. In some cases, during the second period of the disease, the mucous membrane covering the patches becomes of a dark colour, separated from the subjacent tissues, and is observed to be perforated with a large number of holes, giving it a reticulated appearance; these holes are the orifices of the enlarged follicles. If death occurs at a later period, there is sometimes no trace either of the ulcerated or reticulated patches, but merely ulcers. M. Chomel thinks that, in the present state of our knowledge, the ulcers which are formed in the intestines after an acute disease are the result of lesion of the follicles, and not a primary affection of the mucous membrane.

The peculiar interest which at the present time attaches to these anatomical lesions, arises from the fact of their being those which characterize almost uniformly *typhoid fever*. We are not justified in affirming that this fever never exists without alteration of the mucous follicles of the ileum or the glands of Peyer; for M. Andral has clearly shown, in his *Clinique Médicale*, that patients

have perished under fever marked with all the symptoms of typhoid, and yet there was neither exanthema, certainly no ulcerations, nor any appreciable alteration in any part of the digestive tube which would explain the cause of death. On the other hand, there are other diseases, such as cholera, scarlatina, and phthisis, in which the intestinal mucous follicles are altered. After all, however, it appears from the observations of MM. Louis and Chomel, and Dr. Gerhard and others, that, in a very large majority of the cases of deaths from typhoid fever, the glands in question were affected. M. Andral makes the proportion as ninety to a hundred. Of the forty-two subjects examined by M. Chomel, he found the follicles more or less diseased in all of them. M. Littré (*Dict de Med.*, Art. *Dothinenterie*) tells us, that as small-pox has its characteristic pustules on the skin, and measles and scarlatina the exanthema by which they are recognised, so has dothinenteritis for anatomical character a peculiar affection of the glands of Brunner and Peyer.

If we inquire into the alterations of structure of other parts, associated with follicular enteritis, we shall find that there is no constancy in this respect in any one of them, even in the spleen. The liver is softened in half of the cases. Sometimes the mucous membrane of the pharynx and esophagus is ulcerated; and the stomach exhibits various alterations in colour, degrees of injection, ecchymosis and softening; but none of these are peculiar; they are met with in other diseases. Rarely is there any lesion in the duodenum, or the upper four-fifths of the jejunum. Among the lesions occasionally met with in the circulatory apparatus, M. Louis notices softening of the left ventricle of the heart. When this lesion is present it may serve to explain the weakness of the pulse, which we find in some cases of typhoid fever. In the respiratory apparatus, ulcerations of the larynx have been found, and the lungs affected in a majority of the cases, — their tissue being engorged or hepatised in different degrees, and reduced to a hard fleshy mass. The usual change in the lungs in this fever is a livid redness of tissue, which is impermeable to air, and breaks down under the finger. The bronchia are deeply injected. The secretory organs and the cellular and serous systems are rarely affected to any extent, — if, in the former, we except the parotid gland.

As regards the lesions of the nervous system, we should suppose them to be very frequent were we to infer the fact from the frequency of disorder of the senses and of the mental faculties in typhoid fever; but careful observation does not justify any such conclusion. Lesions of the nervous centres are rare, and of small moment in general. There is no appreciable change in the blood in typhoid fever.

Of the *causes* of follicular enteritis or typhoid fever, we are not prepared to speak with any degree of confidence. In Paris it has been found that the most efficacious cause in the production of the disease is the recency of arrival in the capital from the country. I well remember the uniform question asked by Lerminier at the

Charité Hospital, of a patient with this fever, whom he saw for the first time. "How long since you arrived in Paris?" Farther observations, however, have proved that this disease is seen, also, in other towns and villages, and, in fact, throughout France. In reference to the predisposition induced by age, it has been found that this disease attacks chiefly those between twenty and thirty years of age; but it is met with also in children (Rilliet and Roger, *Archiv. Gén.*), and in old persons.

When it prevails epidemically, follicular enteritis may be greatly modified by the extent to which other organs take on associated disease with the ileum. Hence, we have the varieties severally of inflammatory, bilious, mucous, ataxic, slow, nervous, and adynamic typhoid fever. The Germans only know the disease as abdominal typhus. It corresponds with the *typhus mitior* of systematic writers, the *febris lens et nervosa* of Huxham.

I shall not give, in detail, all the symptoms of this disease, the *duration* of which is commonly from twenty to thirty days. The diagnostic ones are thus summed up by M. Andral (*Cours de Pathologie Interne*). Youth; headache, diarrhœa, stupor, delirium, somnolency, *petechiæ*, *sudamina*, epistaxis, intestinal hemorrhage, cough, eschars, particularly on the parts subjected to pressure in lying, fuliginosities of the mouth, meteorism or tympanites. The entire prostration and loss of strength at the onset of the disease are common, almost diagnostic symptoms, in typhoid fever. The petechiæ commonly show themselves not sooner than the eighth nor later than the fifteenth day: they are chiefly confined to the abdomen, and anterior part of the chest; and, besides their being more circumscribed in extent than the petechiæ of typhus, they are of a rose colour. In addition, there are also rose-coloured lenticular spots, or papulæ, sensibly projecting from the skin. They are seen in about the fourth part of the cases. The petechiæ are only seen in certain varieties of dothinenteritis. The *sudamina* are small vesicles, commonly in the region of the neck, armpits, loins, and groins, and formed by a transparent serum which raises the epidermis: they are only occasionally seen.

In addition to the loss of appetite, nausea, and foul tongue, which indicate at the beginning a disease of the digestive functions, there is commonly diarrhœa, sometimes constipation, and a distended abdomen. Pressure on the belly causes a gurgling or rumbling sound, especially in the right iliac region. The pulse is small, feeble, and easily compressible, sometimes voluminous; the skin, at first of an acrid heat, is, after a time, moistened with a viscous sweat. Allusion has been already made to the frequent disorder of the senses and of the intellect: the countenance has a wild and haggard expression, which subsequently is converted into one of stupidity. Among other symptoms of the disturbance of the nervous system are, delirium, singing in the ears, and diminished hearing, sometimes convulsions, and often *subsultus tendinum*. The time at which the symptoms are aggravated and complicated is

usually about the eighth day, when the petechiæ or typhoid spots appear. It is then that there is such a marked expression of stupor in the countenance, red and injected conjunctivæ, and mouth and tongue dry and hard, and covered and lined with a brownish coat (fuliginosity).

As regards prognosis, much will depend on the prevailing epidemic character of the fever. The strong and robust are most apt to perish. The convalescence is generally long and tedious, and relapses are of ready occurrence after any error of regimen or other imprudence.

Amidst the conflicting opinions on the proper *treatment* in this disease, we are left to infer that the safer course, and it is that which I have myself had most reason to be satisfied with, will be to have recourse to venesection in the early period, when the fever is high and pulse full. If the pain and distress in the abdomen be considerable, leeches to the anus, and, if the head suffer much, leeches behind the ears will do good. Cold applications to the head and warm pediluvium or sinapisms to the lower extremities should not be omitted. Of the preference to be given to enemata over purging, although not of course to the exclusion of the latter, and of the means of treating the diarrhœa, and the light in which it ought to be regarded, I need not say anything additional to the excellent admonitions on these points given by Dr. Stokes in his lecture on Ileitis. With the subsidence of the inflammation of the mucous follicles after the first period of the disease may come indications for the use of purgatives more freely than at the beginning. Castor oil and turpentine alternately with small doses of calomel, are remedies entitled to our confidence at this period. After these, or such other analogous means as may have been employed, we shall find the sulphate of quinia a most valuable auxiliary; nor should we be prevented from having recourse to it a second time, because our first trials, made somewhat too early, may not have agreed with the patient.

When perforations of the mucous coat occur, of which increased tenderness of the abdomen and other symptoms of incipient peritonitis may induce suspicion, a fatal result is to be anticipated. Drs. Stokes and Graves, in these cases, have put into execution a practice originally suggested by the latter, viz., of giving large and repeated doses of opium, so as to preserve the intestines in complete state of rest, in order to prevent the escape of fecal matter into the peritoneum, and to allow nature to close the opening by adhesive inflammation. These gentlemen have had some cases to justify the utility of the practice, and although it has not often succeeded, yet it has never wholly failed to alleviate this distressing accident.

LECTURE CIV.

DR. BELL.

TYPHOUS FEVER.—Symptoms—Apparatus most implicated—Resemblance to typhoid fever—Dr. Stokes and Dr. Tweedie's description of intestinal and bronchial complications—Causes—Mortality—Treatment; to vary with the condition of the organs—Depletion at first—Cold bath—Stimulants—State of the heart indicating their use—Tartar emetic in typhous fever.

I PROCEED now to describe the chief traits of typhous fever, in which you will find the closest affinity to, if not identity with, typhoid fever. Here I borrow cheerfully the language of Dr. Stokes, with a feeling of regret that I cannot give you the whole of his lecture on the subject:—

"You will recollect a principle which I have more than once impressed upon your attention, that we are to look on these fevers as general affections of the system, complicated, in the vast majority of instances, with local disease; and that I stated that there was the greatest possible variety in the number, seat, and extent of these local affections. In some cases, they make their appearance almost at the commencement of the fever; in others, they supervene at a more advanced period. In some instances, they are confined to a single system, or even a single organ; in others, the morbid action extends to all the splanchnic cavities.

"The symptoms of typhus may be divided into two classes — the precursory or latent, and the actual or manifest. The precursory are, more or less prostration of strength, a feeling of *malaise* without decided illness, an unusual paleness, a sensation of coldness and perhaps some shivering, a sense of weight about the head, indifference to objects of business or pleasure, troubled sleep and frightful dreams, some nausea, foulness of tongue, and loss of appetite. These symptoms may continue from a few hours to three or four days. In other cases, you will see the phenomena of typhus setting in at once, and with an awful rapidity. This occurs chiefly in cases where a severe epidemic is prevalent, or where the miasm of fever exerts its influence over bodies of men, closely cooped up together, as we see exemplified in camp and jail fever.

"Typhous fever frequently sets in with a state of the system closely resembling inflammation. The skin is hot and dry, the pulse full and bounding; and this often leads the practitioner to think that he has to deal with ordinary inflammatory fever, and he bleeds with the expectation of cutting it short; but it too commonly happens that we are very seldom indeed able to effect this desirable purpose by bloodletting. You may succeed in modifying the symptoms, but you cannot arrest the disease. It is, in fact, a question, how far general bleeding is admissible in the great proportion of cases of typhus. I shall examine this point more particularly when

we come to the treatment of fever. If you take blood from the system generally in this apparently inflammatory condition, you may find, in some instances, that the clot will be of a red colour, and crusted at top with a slight coat of buff; in other cases, you will perceive that the quantity of serum is trifling, the clot of a dark red colour, easily broken up, and without any buff.

"Whether bleeding has been performed or not, the pulse begins to alter about the third or fourth day, and this simulated appearance of inflammation goes away; then comes a train of nervous symptoms — anxiety, restlessness, delirium, *tinnitus aurium*, with an augmentation of the febrile symptoms towards evening. In the morning the patient feels better; and this is almost always the case, for we seldom meet with a case of typhus without morning remissions. In some cases the symptoms are aggravated on alternate days, so as to bear some resemblance to double tertian. Sometimes the exhalent vessels of the skin are in a state of great activity, and the patient sweats profusely almost from the commencement of the disease. These cases we have found in the Meath Hospital to be extremely tedious. In the greater number of cases the skin remains dry, and this often continues through the whole disease up to its termination. With respect to the appearance of petechiæ, they may occur at an early period, or not until towards the close of the fever. The appearance of petechiæ has one particular value, as being a symptom most commonly connected with fevers of an essential type, and rarely with those of a simple inflammatory character, or where the fever is symptomatic of local disease. Thus, we very seldom meet with petechiæ in the fevers which accompany cerebritis, or pneumonia, or gastro-enteritis. On the other hand, where the inflammation of these organs is secondary, and supervening on typhus, petechiæ are exceedingly common.

"As the disease advances, we observe other symptoms. The patient has more or less stupor, sighs frequently, answers briefly and impatiently when questioned; his eyes are red, glazed, and filled with the lachrymal secretion; his nostrils obstructed with adhesive mucus, which he repeatedly attempts to remove; he is sometimes quite deaf, without any apparent affection of the ear; his lips are dry and chapped, and his teeth and gums crusted with a dark sordes. If you ask him to put out his tongue, he moves it slightly forwards, being unable to thrust it out fully, from its dry state and the injury of its muscular functions. Its upper surface is generally of a dark brown colour, or even black; its mucous covering chapped and inclined to bleed, and feeling quite dry and relaxed; but there is an infinite variety in the state of the tongue in typhous fever. Not unfrequently it is moist; and I have seen cases in which it was nearly natural throughout the whole course of the disease. In many cases it is red, dry, tremulous, and pointed; and in such cases we have generally observed symptoms of gastro-intestinal irritation. But it is a well-established fact, that we may have fever with gastro-intestinal disease, and yet without any cha-

racteristic appearance of the tongue. In typhus, the tongue is not a correct index of the state of the intestinal canal; and if you were to take it as the grounds of your diagnosis, you would often fall into error. You should, therefore, as I have before taught you, study the appearance of the tongue in fever more as indicative of the general condition of the patient than of the state of the gastro-intestinal membrane. You may have extensive disease with a natural tongue, and you may have a morbid state of the tongue without any appreciable intestinal lesion. You will often see in the advanced stage of fever a red, dry, and chapped tongue become pale, moist, and smooth under the use of wine, carbonate of ammonia, and other stimulants; and yet, in such cases, if you were to judge by the tongue alone, you would say that there was inflammation of the intestines, and that the employment of stimulants was dangerous: and, indeed, if it was ordinary inflammation, we know that it would be exacerbated by stimulants.

"In some cases of typhus there is thirst, and a desire sometimes for hot, sometimes for cold, drinks; in other instances, the patient drinks very little, and never complains of thirst. At one time wine is relished, at another time it is not. The skin varies as to its condition, being sometimes bedewed with profuse clammy perspirations of a well-known odour; but in the greater number of cases it is dry and harsh. Sometimes there is diarrhœa, tympanites, and tenderness of the belly; occasionally it is soft and flaccid, and pressure is borne without inconvenience. The state of the urine, which engrossed so much attention in former times, cannot be looked upon as a diagnostic in typhus. In bad cases it is, as well as the stools, passed involuntarily. This at first occurs during the patient's sleep, but as the disease advances it is passed unconsciously. It is not uncommon, on the other hand, to meet with retention of urine.

"As the symptom advance, the patient lies entirely on his back, quite indifferent to everything, with his lower extremities separated, and the trunk constantly sliding down in the bed from debility. The eye is dull, without meaning, and of an ecchymosed appearance. During his brief and unrefreshing slumbers, the eyelids are only half closed, and the eyeball is turned upwards. The delirium, feebleness of pulse, and prostration of strength increase. A quantity of liquid feces is discharged involuntarily, the belly is tympanitic, and hiccup comes on, which generally proves a very distressing symptom. At this period, also, we frequently have hemorrhagic discharges from various parts of the body — the nose, stomach, bowels, and urinary organs. If the patients holds out for any considerable length of time, bed-sores begin to form on the back and loins, which are frequently surrounded by an erysipelatous border, and have a great tendency to run into mortification. The patient gradually gets weaker, his extremities become cold, his pulse thready, irregular, and indistinct; the hiccup increases, and there is sometimes regurgitation. He now begins to sink

rapidly, his eye is glazed, his jaw fixed, his face Hippocratic, his stupor increases, and he dies with tracheal rattle."

An analysis of the symptoms of typhous fever presents them to our observation as they are furnished by the digestive, respiratory, and nervous systems, and exhibits its close resemblance to, if not identity with, typhoid. The disorder in the digestive system is manifested by the appearance of the mouth, tongue, and throat, which are dry and covered with adhesive mucus, and the tongue often becomes of a dark-brown or black colour, its upper surface chapped or inclined to bleed. Then we have thirst, nausea, and hiccup. There is great variety in the evacuations from the bowels. Generally speaking, they are liquid, of an unhealthy colour and consistence, and have a peculiar and very offensive odour. *Obstinate constipation may be met with*, but this is very rare, and in a great majority of typhous fevers *there is rather a tendency to diarrhœa*. There will be also eructations, borborygmi, and tympanites.

When we turn, says Dr. Stokes, to the respiratory system, we find typhus presenting here also a very numerous and important group of symptoms. In some cases we have hurried breathing, with cough, and signs of organic lesion of the lung; in other instances the breathing is accelerated, but we are not able to detect any appreciable lesion. Here we have a purely nervous dyspnœa; in the former case we have it coexisting with disease of the lung, which can be detected by the stethoscope. Hurried respiration is an unfavourable symptom in fever. It points out either an organic affection of the lung, or a sympathetic excitement. Hurried respiration, without pulmonary disease, is an anomalous symptom, and all such are to be looked on with suspicion. We have sometimes the symptoms of a general affection of the respiratory system — cough, dyspnœa, lividity of countenance, and bloody expectoration. There is nothing more common in typhus than catarrh, or congestion of the lungs, or pneumonia. A great many fever patients die of extensive but latent and neglected bronchitis. The patient may go on for days and weeks without presenting anything capable of arresting the attention, or exciting the suspicions, of the mere symptomatologist; they will die with tracheal rattle, and, on dissection, the whole bronchial mucous membrane will be found in a state of intense inflammation.

The nervous system manifests its disorder by *direct and great prostration*, without any perceptible local cause to account for it. We meet with different *varieties of delirium*, furious excitement of the brain, or low and quiet muttering; then the symptoms connected with the muscular system, as floccitation, *subsultus tendinum*, pains and spasms in various parts of the body, tremors, and paralysis of the sphincters. The circulation in the beginning of the fever is often accelerated as if there were inflammation, but this soon subsides, and we have a weaker and jerking action of the heart with a feeble irregular pulse, which can be compressed by a slight touch of the finger. The *heart* itself, and particularly the left ventricle, is *weak*,

and *in cases softened.* The blood is inferred to be altered in typhus, but hitherto chemistry has not revealed any very positive facts on this head, except those which are directly deducible from imperfect oxygenation and decarbonation in co-existent bronchitis.

Dr. Tweedie (*Clinical Illustrations of Fever*) regards affections of the lungs and intestinal mucous membrane as essential constituents of typhous fever. When associated with bronchitis, this fever is perhaps the most hopeless of all fevers. Dr. Stokes says:—"If you refer to the best practical treatises on fever published in this country, you will meet with innumerable instances of the remarkable prevalence of gastro-intestinal disease in typhus; and in France so constantly have inflammation and ulceration of the mucous glands of the ileum and other portions of the intestinal canal been discovered, that Andral, in his last edition of the *Clinique Médicale*, ranges fevers under the head of abdominal diseases. It is very probable that, in France, these secondary lesions are more frequently met with than in this country, and this I freely admit; but I can say, that even here they are exceedingly common, and form a most important and prominent feature in the pathology of typhus.

With respect to the extent of this disease of the intestinal glands, there is considerable variety. In some patients we find it very extensive, and forming a large sheet of ulceration; in others it is confined to a few small isolated patches. We may meet with it under its different phases of turgescence, softening, or ulceration; or we may have these three states coexisting in the same individual."

The diagnosis of this complication of intestinal disease is thus described by Dr. Stokes:—"Sometimes we find a degree of tenderness on making firm pressure over the region of the ileum, but this is by no means of constant occurrence. But the most important aids towards forming a correct diagnosis are furnished by three symptoms, most commonly found in connection with these latent pathological changes. The first of these is great thirst without vomiting, and, generally speaking, a preference for warm drinks. The next is early tympanites. The last is the occurrence of diarrhœa. These are the symptoms generally observed in cases where disease predominates in the small intestines. Thirst, with a preference for warm drinks, is a very common symptom of this affection; and the occurrence of early tympanites is, generally speaking, an ordinary accompaniment, and tends to throw much light on the nature of the disease. With respect to diarrhœa, it may be stated, as a general proposition, that, in the course of typhus, diarrhœa, when not critical, is one of the most positive indications of an inflammatory condition of some portion of the digestive tube. In many cases, diarrhœa does not appear until ulceration of the mucous membrane has taken place. Previous to the occurrence of ulceration, we have an increase of fever, with thirst, and perhaps some tenderness of the belly, and then diarrhœa sets in. There is nothing more common in hospital practice than to see a case of apparently

simple essential fever going on without any particular abdominal symptom for ten or fifteen days, when it begins to change its character, diarrhœa sets in, and runs the patient down rapidly, and, on dissection, we find extensive ulceration of the small intestines." The *spleen is generally found much softened and enlarged;* the liver is more rarely enlarged, soft, and friable.

Of the frequency of *ulceration* of the *Peyerian glands* in typhous fever, we can form a pretty good idea from the following table in Dr. Tweedie's work, already quoted:— Of 54 fatal cases of fever examined, inflammation of the intestinal mucous membrane was found in 24, and of these 16 were ulcerated.

Ulceration of the	ileum	occurred in	8
„ „	ileum and cæcum		2
„ „	cæcum		1
„ „	ileum, cæcum, and colon		1
„ „	ileum and colon		4
			16

In many of these cases the *mesenteric glands were found more or less enlarged;* some of them were of the size of a walnut, and, on being cut into, contained a small quantity of pus.

It thus appears that, in fever, ulceration is most common at the termination of the ileum near the ileo-cæcal valve.

The ulcerations varied both in size and depth, in some instances they were not larger than a small seed, the largest was about the size of the present half-crown piece. Difference in locality make a great difference in the extent of intestinal lesions. Thus, at Edinburgh, the proportion of fatal cases, with lesion of the patches, amounts during a series of years to but a small fraction of the whole; at Anstruher, thirty miles distant, no case is examined without these being discovered.

Intestinal perforation also occurs in typhous fever. *Petechiæ, gangrene*, glandular swellings, or *erysipelatous inflammation* of the skin, were observed in this disease. Common and severe as are its disorders of function, *lesion of the brain in typhous fever is comparatively rare.*

Bronchitis is a common accompaniment of typhus: it gives a greater or less lividity of countenance to the patient. Pneumonia may occur under two forms; its symptoms may be manifest and prominent, or they may be latent and inappreciable. Of these, the latter is the most common.

In inquiring into the *causes* of typhous fever, we are at once struck with the influence of scarcity and privation and impure air in giving rise to or keeping up the spread of this fever. It is chiefly by a deterioration of the air caused by emanations from a typhous fever patient that the healthy are affected, and the disease is thus disseminated. The fact, or if it be one, the frequency and extent of contagion proper, are not common. Typhus can be readily ori-

ginated by a number of people congregated in a small space and precluded from fresh air.

The mortality in typhus has varied, in the London Fever Hospital, from 1 in 6⅔ to 1 in 11¾. The greatest mortality was in persons of between 15 and 20 years of age.

Treatment. — Bloodletting once freely used in typhous fever, came afterwards to be regarded with horror, and then again acquired vogue, to be again regarded with mistrust, or at least diminished confidence. Seldom required in simple typhus, it becomes necessary at times when there is complication with visceral inflammation. In this case we prefer the local detraction of blood by cups or leeches. From the frequency of abdominal inflammation in fever, there is no part of the body which requires the topical abstraction of blood so frequently as the abdomen. The local abstraction of blood was of much use in some cases of diarrhœa, which, though unattended by pain, or any dysenteric symptoms, probably depended on inflammation of some portion of the mucous membrane of the bowels. In protracted cases of fever, I think the local is preferable to the general abstraction of blood in inflammatory diarrhœa, unless the state of the pulse, and other symptoms, denote much general excitement. Emetics, often had recourse to, are useful either very early in the disease, before there is gastritis, or late, when the bronchia are choked up with mucus. Purging by calomel and rhubarb or castor oil, and castor oil and oil of turpentine, is often of service when there is no intestinal phlogosis or ulceration. If purgatives are withheld, enemata may be had recourse to.

The indications for the employment of curative agents in this simpler form of typhus are furnished by the state of the suffering organs. The heart is unduly accelerated, and hence the frequent pulse; the skin which is hot and acrid, and the mucous membranes require to be restored to their appropriate secretory and absorbing functions, and the glands to their secretory and depuratory office. On the skin we should act at once by means of cool air, or, if this be wanting, cool or cold water supplied in the fashion of sponging, or by affusion or immersion. Cool or cold bathing has been attended with excellent effects by often arresting the fever in its first stage, or by greatly mitigating the violence and gravity of the symptoms in its progress. In the somewhat analogous state of the system induced by a poison, such as opium, in which the capillaries are in a state of morbid excitement, and largely evolve animal heat, at the same time that the breathing is laboured and the brain oppressed, a shower-bath rouses the nervous system from its torpor, and restores the respiration to its former state. If we admit that this system is poisoned in typhus, we have an argument from analogy in addition to the positive experience of Currie, Jackson, Giannini, and others, in favour of the cold bath, and particularly in the form of a shower, for the cure of this fever. According to the predominance of excitement in an organ or region, as, at one time, of the head, at another of the epigastric region, will be the

special direction of the cold shower, or the application of cold cloths, or even of ice. Dr. Stokes has spoken of cold applications to the head; I have used with marked benefit this remedy to the epigastric region, the heat of which, and indeed over the whole abdomen, is often so excessive in typhous and typhoid fevers. The patient will press with evidence of pleasurable sensation the cold cloths, or ice folded in cloths, on his epigastrium, and ask for a renewal of them. I speak under the supposition that our patient is labouring under a completely formed fever, and is in that stage in which professional assistance is commonly wanted. In the forming or preliminary stage, that in which the nervous system is the part chiefly affected, and in which the temperature of the surface is unequal, the patient at one hour shivering, at another complaining of too much heat, a warm bath will prove to be soothing and salutary, and may, if its operation be aided by simple drinks, bring on a diaphoresis, which will restore the skin to its natural state and contribute to an equalizing of the other deranged functions. It is important to bear in mind the fact, that the salutary change which is brought about in the capillary circulation and secretions of the skin are responded to in a similar sense by the gastro-enteric and pulmonary mucous membrane: the thirst, dryness and heat of the mouth and fauces, and the gastric sensations of heat, are all greatly mitigated after a cold bath or cold affusion. The breathing also is freer, and the expired air less hot and offensive after this remedy.

Nausea and some efforts to vomit, are common symptoms in the inception of typhus. It is well known to us all that the operation of a poison which is not directly and speedily narcotic, is to excite the stomach and bowels to empty their contents, and to pour out their mucous secretions, and soon after to excite all the organs of depuration or excretion, in order, as we should say, that the poison might be eliminated from the system. In such cases we are anxious to discharge the poison from the stomach, and if we can do so speedily, we prevent the train of symptoms which would otherwise follow; and among these are narcotism — stupefaction, and obliteration of sentiment, as well as violent efforts of the secretory organs. In typhus we are not prepared to say that there is a poison in the stomach, although it is very probable that this organ has been poisonously affected. At any rate, by an emetic we invert the process which was going on — we produce secretion and excretion, discharge from the stomach and bowels, in place of the absorption and introduction of depraved matters into the general system. We must continue, by the use of purgatives, the elimination of matters from the digestive canal, which was begun by vomiting.

By this treatment we remove some of the probable causes, and abate, if not dissipate, some of the obviously troublesome symptoms in the first formed stage of typhus. In milder cases, this is often alone sufficient to check the farther progress of the disease, and to bring on convalescence. Whether we suppose that there is a morbid excitement which required subduing, or a poison which

ought to be eliminated, we are justified in acting on the stomach and bowels in the manner already mentioned. If we do not thereby cure, we at least diminish the probabilities of farther mischief. By the cold affusion, or continued application of cold locally, we abate the excessive heat, itself a disturbing cause both to the nervous and the capillary system, and we rouse the patient from the narcotism into which he had been thrown by the workings of the poison on the brain and senses.

It may be thought that at the very outset of the disease we ought to satisfy ourselves respecting the question of bloodletting in typhus; since if it is to be used, it may be alleged that the earlier the better. As a general rule, this is correct; but it is probably less applicable in typhous fevers than in most febrile and inflammatory affections. Still, recurring to the phenomena of admitted poisoning, and the treatment adopted in consequence, we find that early bloodletting is properly objected to until we can withdraw as much as possible of the poison from the cavities and the surfaces to which it is applied; for otherwise introduction of the poison into the vascular system, and its action on the nervous, would be increased by venesection, since we know that absorption is singularly facilitated by this means. Again, — as Dr. Stokes has satisfactorily shown, various phlegmasiæ may arise in the progress of the fever, which will require the use of the lancet, or the local detraction of blood; although at the beginning these means are not called for, and are often contraindicated. I shall not present the various authorities within the last twenty years in favour of bloodletting in typhus; but content myself with remarking, that if when the reaction is completed, and there are distinct evidences in a somewhat full and slightly resisting or jerking pulse, great pain of the head and back, and congestion in the lungs or abdomen, we may open a vein with advantage, remembering at the same time to stop the flow of blood sooner than we would in the undoubted phlegmasiæ, or in other forms of fever more unequivocally marked by great excitement. The appearance of a buffy coat will not encourage us to repeat the operation, if the evidences already mentioned are not clear and forcible — nor will the absence of any buff cause regret if these enforcements are present.

Much will depend on the prior state of the patient, his temperament, particular exposure, and habits, as to the propriety of using the lancet. One person may have been exposed to the operation of causes which were fast bringing on cerebral inflammation or meningitis; and his case will require a large detraction of blood similar to that practised by Armstrong in this fever. Another had chronic gastritis before typhus, and he will be benefitted at once by leeching; —a third, again, poorly fed and clothed, struggling against want, working hard, early and late, anxious for the morrow, not on his own account, but on that of a wife and children, will have been exhausted before the onset of the fever — his heart, already weakened with the perpetual mental anxiety, will sooner become softened and unfitted to propel the blood. This person cannot tolerate

bloodletting, and but little purging: the stage of prostration is soon reached with him, and the urgency for administertng wine and other stimulants is manifest.

After having either practised venesection or used cups or leeches, or satisfied ourselves of the inappropriateness of these remedies, we may now resume the treatment already recommended to quicken the action of the depurating organs. With this view, we shall administer calomel in small doses to aid the bowels and liver; turpentine and nitre, and other salts, including the hydriodate of potass, the kidneys; polygala senega and squills, the lungs. For these latter, their appropriate hygienic exciter, pure and fresh air, should be freely admitted into the sick room or hospital ward, night and day. It will contribute powerfully to purify them from the morbid bronchial exudation, and to quicken the capillary circulation with its accompanying processes of oxygenation and decarbonation of the blood. The air ought to be diffused equally and gradually, not blowing in currents and with impulse on the body of the patient. If sometimes bronchitis predominate, calomel in small doses, say a grain every two hours, with polygala senega, will not be omitted.

Throughout the whole course of a case of typhous fever, as indeed of most fevers, and many of the phlegmasiæ, we ought carefully to guard against the common error of bespeaking, as it were, and persisting in a uniform plan of treatment and a certain series of remedies. Our not having bled at the beginning of the disease, is no good reason for our refusing to do so in its progress. Cold, unpleasant at first, is often refreshing and sanative, and is commonly allowable when the gastric symptoms predominate; but it must be withheld if the lungs or their membranes are inflamed. The stomach, originally but little affected, may, in a week's time, suffer under gastritis, and require free leeching. The quinia which we give to-day from a belief that the stage is reached in which it will be useful, may still disagree with the patient; but we must not on that account be backward in giving this medicine two days or even another day hence. If there be any notable change in the symptoms, purgatives, proper in the beginning of typhus, will often, if persisted in, prove injurious irritants, and yet, in a later stage, they may give a salutary turn and seem to produce a crisis in the disease. During a period of ten days, I have, in some cases of typhoid fever, trusted entirely to simple cold or tepid water enemata, which served both to abate the morbid heat of the abdomen, and to procure a discharge once in the twenty-four hours from the bowels.

But with whatever industry and judgment we may follow up the practice, the heads of which I have just sketched, typhus will still persist in its course, after a while to take a salutary turn towards recovery and health, or to assume a more and more aggravated and complicated character. Among the aggravations, will be depression of the cerebral functions, such as stupor and coma, or disturbance manifested by delirium and increased frequency and weakness of the contractions of the heart; whilst in the complica-

tions will be ranked pulmonary congestion and bronchitis. There is one important point on which Dr. Stokes has elsewhere enlarged with more fulness and detail, and which, on account of its being so important a feature in the disease, merits attentive consideration. I refer now to the state of the heart in the later stages of typhus, which is in a measure made known to us by the rapid and feeble pulse; but more fully indicated by auscultation, and in fatal cases by dissection. It has been long a familiar fact to those who had occasion to treat typhous fever with stimulants, that the best measure of their beneficial operation was a diminished frequency and greater fulness of the pulse; and that, on the contrary, if the pulse became more frequent and smaller, the use of this class of medicines was to be discontinued, and the augury of the case was at the same time commonly unfavourable. I well remember to have heard of, though I cannot say that I actually witnessed, enormous quantities of diffusible stimulants, such as brandy and wine, being used in the advanced stage even of the remittent fever in Virginia, which in this period is commonly designated as typhus or typhous. Except to a physician who has had actual experience on the subject, the toleration of the sanguiferous and nervous systems to such large quantities of wine and ardent spirits and carbonate of ammonia, would be absolutely incredible. Once more, after a period which I would fain not consider very long, for it is included within my own professional observation, we find the practice of the free use of diffusible stimulants in certain forms and stages of typhus to be renewed, and precisely after the same indication as before, to rouse and strengthen a weakened heart and prostrated nervous system; and persevered in for the same reason, viz., a change of the pulse to slower and fuller. Now, however, that it is in our power to take more accurate measure of the real state of the heart by means of the stethoscope, we shall be able to define with more nicety the indication for the use of stimulants, as well as for their discontinuance, than when we formed our opinion of the heart entirely from the signs furnished by the pulse. It has been the good fortune of Dr. Stokes to give a complete practical application of the general theory of a weakened circulation, and especially of a weakened heart, in typhous fever. His views and cases in illustration are to be found in the *Dublin Journal of Medical Science*, for March, 1839.

"In typhous fever," as Dr. Stokes remarks, "two opposite conditions of the heart may be observed; in the one the impulse becomes extremely feeble, or altogether wanting, while the sounds are greatly diminished in intensity; while in the other the heart's action and sounds continue vigorous throughout the whole course of the disease.

"These opposite states are not necessarily revealed by the state of the pulse or the warmth of the surface. We may observe a hot skin, while the action of the heart is almost imperceptible, and on the other hand a patient may be pulseless, cold and livid for days together, while the heart is acting with the greatest vigour.

'The condition of the heart must be determined by the application of the hand and stethoscope to the infra-mammary and sternal regions."

Dr. Stokes, after introducing some observations of Laennec and Louis respecting the softening of the left side of the heart in fever, tells us, he has no doubt that the cause of the want of impulse, and feebleness or cessation of the first sound, is a softening of the heart. It will be remembered that the observations of M. Louis were made on the hearts of those who died of typhoid fever, and those of Dr. Stokes apply to typhous fever; thus furnishing additional proof in favour of the general sameness of the two diseases, or rather of our regarding them as varieties of the same disease. Dr. Stokes's proposition in favour of the organic cause of the symptoms above mentioned are thus stated: —

I. Softening of the heart exists in typhous fever as a local disease, and without any analogous condition of the muscles of voluntary life.

II. In the dissections in the last epidemic, this softening of the heart was met with in cases which during life had presented the phenomena in question.

III. The physical signs indicate a debility of the left ventricle principally, and it is the portion of the organ which is most often altered in consistence.

IV. Laennec has stated that, in proportion to the severity of the putrescent phenomena is the liability to softening of the heart. And the same observation is found to be true of the physical signs now described.

The farther analogy which the typhus bears to poisoning is exhibited in this peculiar impression on the heart — an effect which, on the authority of Orfila and others, is produced by the ingestion of arsenic.

If this softening of the heart be one of the secondary diseases of typhus, we should, Dr. Stokes thinks, observe something like periodicity in its phenomena, as in the case of other lesions. It should appear at a certain time, and decline after its proper period expired. On an analysis of his cases, with a view to these points, the result was that in most instances the signs of diminished impulse and of first sound were developed *at or about the sixth day*, and the heart seemed healthy *at or about the fourteenth day*.

The practical inference from these several facts is, that *in the diminished impulse, and in the feebleness or extinction of the first sound, we have a new, direct, and important indication for the use of wine in typhous fever*. In some cases, continues Dr. Stokes, the existence of these phenomena at an early period of the disease led us to anticipate the bad symptoms, and to commence in good time the use of the great remedy; and in others, notwithstanding the existence of some visceral irritation, the use of stimulants has been adopted with the best success from the same indication.

Important as is the guide thus furnished by the state of the heart for the use of stimulants, it may not be in the power of all without

some experience to avail of it. The practitioner will, therefore, do well to attend to the following points, directed by Dr. Armstrong, in forming his opinion of the propriety of persevering in the administration of wine to a patient in typhous fever.

1. If the tongue become more dry and baked, it generally does harm; if it become moist, it generally does good.

2. If the pulse becomes quicker, it does harm: if it be rendered slower, it does good.

3. If the skin become hot and parched, it does harm; if it become more comfortably moist, it does good.

4. If the breathing become more hurried, it does harm; if it become more deep and slow, it does good.

5. If the patient become more and more restless, it does harm; if he become more and more tranquil, it does good.

You must be cautious in observing its effects; and till you see which way they tend, you should give it only in teaspoonfuls.

Harmonizing well with wine at this stage of typhous fever is quinia, in the prescribing and continuing the use of which we must be guided by nearly the same rules with those which regulate us in that of the former remedy.

One advantage, and a great one, which, it seems to me, wine possesses at this time, and it may be added in the advanced stages of many diseases, over more potent stimulants, is in its beneficial action on nutritive life, which is in these cases very low, and the extreme depression of which will alone kill. At particular epocha in febrile diseases we have more to apprehend from nutritive debility than from the disorganization of an important organ or functional tissue. Under this impression we ought to watch the very first calls made by the system for mild nutriment, and administer it accordingly in the form of sago, or arrow-root, or panada to which a certain portion of wine is added. Fulfilling the ends both of a medicinal and nutritive stimulus, wine-whey is often an admirable aid at this time. I have frequently, I am sure, preserved life for days by this article, towards the termination of diseases, phthisis pulmonalis, for example, necessarily fatal. If one is not sure of the quality of the wine, or if it is not readily procurable, it will be better to turn the milk by an acid, and then add to the whey thus made a portion of spirits — brandy or rum, &c. Milk-punch, a favourite prescription with some physicians, is objectionable in many cases on account of the milk being oppressive to an enfeebled stomach, and not readily disposed of by absorption and subsequent action on the excretory organs, particularly the skin and kidneys, as whey is.

A cautionary advice should be added by the physician who recommends stimulants of this kind — wine and distilled spirits, — to be given to his patient. It is; not to confound their occasionally curative powers in some extreme cases of disease with their effects when used habitually. Opium, quinia, arsenic itself, are given in disease, but the fact furnishes no argument for their daily use by a person in health. In the one case as in the other, a medicine thus

regularly used in a common state of the animal economy becomes a poison; and it is doubtful whether this principle would be more clearly demonstrated by the habitual use of arsenic than it is by that of brandy, or rum, or whiskey.

There is one remark which I have to make on the views and deductions of Dr. Stokes. It is, that, although the principle which he inculcates is exceedingly valuable and susceptible of demonstration and practical application, not only in typhus but in other forms of fever, yet the practitioner, in the country especially, who may have to treat sporadic cases only of typhus, or others of a typhoid character, must not expect to find the heart lesed, and its function enfeebled to such an extent as that pointed out by Dr. Stokes, and which is so common in the typhus occurring in a crowded and destitute population, and especially in that which is met with in the hospitals. The air of a hospital speedily displays its deteriorating and depressing effect on all the functions, and greatly increases the tendency to a softening and loss of tone of the solids and analogous changes in the blood.

Notwithstanding the extension of this lecture on typhous fever beyond what I had anticipated, I must, ere I conclude, notice what may be called the antimonial or rather the tartar emetic practice in this disease. Rasori, the founder of the new Italian medical doctrine of counter-stimulus, was in the habit of administering tartar emetic in quantities of four, six, or eight grains during the twenty-four hours, in an epidemic petechial typhus which prevailed in Genoa when it was besieged by the Austrians in 1799. He gave it in water, flavoured with substances most agreeable to the patient, but most commonly with cream of tartar. As he informs us in his treatise (*Storia della Febbre Epidemica di Genova*) sometimes venesection preceded the administration of the tartar emetic. He continued the medicine from the beginning of the disease on to convalescence—not as a novice in a knowledge of the operation of antimony on the system might suppose, by vomiting and nauseating, and perhaps also purging, his patient all this time. Not at all — the effects of the medicine were manifested in a gradual abatement of the febrile disturbance; generally without vomiting or purging, or any evacuation. Rasori records, among others, the case of a young man, of a robust habit of body, seized with the fever, to whom he gave during the first day four grains, and afterwards increased the quantity until sixteen grains of the tartar emetic had been taken, without any evacuation either by the mouth or from the rectum resulting. A purgative enema was then given, which was returned without the addition of any fecal matter; but the patient's condition was soon ameliorated, and a continuation of the medicine in smaller doses restored him to health in a week. Another case was that of a young goldsmith, also of a robust habit, who on the first coming on of the fever was seized with violent delirium, which after a few days was followed by a profound stupor, so as to prevent his taking anything whatever by the mouth. Enemata were, therefore, admin-

istered; a single one of which contained half an ounce of nitre and sixteen grains of tartar emetic; but no discharge from the bowels took place until after the fourth clyster, to which an ounce of common salt had been added. The enemata were continued without the salt, and according to custom caused no evacuation; to produce which, when it was desired, it was always necessary to add the salt. Under this treatment the stupor ceased about the eleventh day. From this time the patient made use, daily, of a lemonade in which six grains of tartar emetic had been dissolved, but still without the latter causing any discharge, which, however, was obtained from time to time by the enemata as before. After three weeks the disease took a favourable turn, and the cure was completed with small doses of nitre and tartar emetic.

How far this practice of Rasori may have suggested to Dr. Graves that which I am about to describe, is not a matter of any moment. It is with the result that we have to do more than with the means by which the former was reached. The distinguished Dublin physician, an ornament of a city which can now boast of so many celebrated men in all the departments of medicine, prescribed tartar emetic in *delirium tremens*, from a belief that the preparations of antimony have a distinct narcotic effect, and because he had seen patients in fever whose watchfulness had been removed by antimony given in the form of tartar emetic or James's powder. "Our predecessors," he observes, "were much in the habit of using antimonial mixtures in the treatment of fever; and they did this because they knew, by experience, that these remedies worked well."

In subsequent clinical lectures, Dr. Graves explicitly describes the symptoms in continued fever, which indicate the propriety of using the tartar emetic. In some cases the patient has reached, we will suppose, the third day of the fever, and has now a flushed face, and headache; his pulse is from 100 to 110, but not remarkably strong. He is, also, found to be sweating profusely from the commencement of his illness, but without any proportionate relief to his symptoms; and he is, moreover, restless and watchful. This patient may have no epigastric tenderness, no cough, no sign of local disease in either the thoracic or abdominal cavities; he has been purged, used diaphoretics, and perhaps mercurials; every attention has been paid to regimen, ventilation, and cleanliness; but still he lies there in a state of undiminished febrile excitement, with persistent headache, quickness of pulse, and sleeplessness. In a case of this nature, Dr. Graves has directed venesection, which was performed with some relief, and without increasing the debility.

The simple announcement that a particular medicine is beneficial in a disease is apt to mislead, unless the chief circumstances under which the remedy should be administered are also distinctly defined and the occasional embarrassment in the case noted at the same time. For this reason, and in justice to Dr. Graves, as well as to those of you who may desire to imitate his practice, I shall give one more picture of the symptoms for the removal of which this

gentleman believes the tartar emetic to be available. On this point he thus discourses in a lecture on the spotted fever epidemic in Dublin in 1834–5: — "I wish you clearly to understand, that, after the headache and cerebral excitement which accompanied the very commencement of the fever, had been subdued, or had ceased; after sleep and calm had returned, and had continued for many days, then a new order of things commenced; *subsultus*, watchfulness, muttering, raving, involuntary discharges, &c., all denoted great derangement of the nervous system; but still there was no proof that this derangement depended on cerebral congestion. After a few, or after many days, however, unequivocal symptoms of the latter set in; the face and eyes became suffused and flushed; the pupils manifested a tendency to become contracted, and occasionally convulsions took place; the patient became totally sleepless. When the latter and dangerous period of the fever was accompanied by the former nervous group of symptoms *alone*, they yielded to wine, musk, porter, and opiates; but when the symptoms indicating cerebral congestion were superadded, then it was that the case assumed so great and striking a similarity, so far as the functions of the nervous system were concerned, to the well-known variety of *delirium tremens*, accompanied by cerebral congestion, — to that variety of *delirium tremens*, in fact, which can only be successfully treated by the judicious but bold exhibition of tartar emetic combined with laudanum."

Dr. Graves claims the discovery of the utility of this practice in the advanced stages of spotted fever as peculiarly his own. I could wish that he had not added the assertion, "for there is not, in the writing of any author on the subject, the slightest trace of such a method to be found." The lecturer had at the moment forgotten the practice pursued by Rasori more than thirty years before, a sketch of which I have already given, and which certainly exhibits something more than 'the slightest trace' of Dr. Graves's method — in spotted fever, too. Even the administration of tartar emetic in an enema, as extolled by this gentleman in cases of delirium occurring in the progress of fever, was directed by Rasori under similar circumstances, in the case which I have already detailed. Two or three grains of this salt are recommended by Dr. Graves to be dissolved in four or five ounces of mucilage of starch or isinglass, and to be injected with the end of a long flexible tube, so as to make the contents of the syringe pass high up into the bowel. "In this way you can secure all the good effects of tartarized antimony in overcoming the congestion of the brain, and procuring sleep."

In some of the more desperate cases of fever in which cerebral symptoms predominate, as well as in other cases of hydrocephalus, Dr. Graves has directed, with happy effect, tartar emetic ointment to be rubbed over the shaven, and subsequently blistered, scalp — painful and violent inflammation results, and a removal of the worst symptoms.

The troublesome thirst in fever, which is now so generally and

properly counteracted by cool and often cold and iced drinks, is often still more effectually subdued by a slight bitter infusion, to which a little mineral acid has been added, than by large aqueous potations alone.

In taking a survey of the whole subject of fever, its proteiform features, and the multifarious and often contradictory remedies, not to say plans of treatment, which have been at different times employed for its cure, we may, indeed must display, a wholesome skepticism of the extraordinary results attributed to the enforcement of the rules of art; the more especially so when we find on record so many instances of cures accomplished by nature, and nature sometimes crossed too by popular ignorance and superstition. A passage in a paper just now before me, (my account of the *Contagious Fever in Italy in* 1817,) will come in appropriately in illustration of this truth. "To prove how much nature is capable of performing, and to what extent we should rely on her exertions, Valentini says, that in a great number of cases of this fever, he has administered nothing but copious drinks either of pure water or of lemonade, or of nitrous emulsion. He cites, as a proof of the efficacy of this plan, the cure of a soldier in the Pontifical service, thirty-three years of age, and of a robust habit, who was seized with the gastric-nervous fever. This man obstinately refused all medicines except an emetic which had been given at the commencement of the disease, yet by his drinking simple lemonade, and abundance of the purest water, after having suffered the attack of mortal symptoms, on the seventeenth day of the disease he fell into a copious sweat and recovered. I was persuaded, continues Valentini, of the inefficacy of medicine in the greater number of cases, and willingly followed the wishes of the patient. He supports his opinions by referring to Hippocrates and others of the ancient as well as modern writers; and concludes by a quotation from Celsus, in which this author says: "*Multi magni morbi curantur abstinentiâ et quiete.*"

LECTURE CV.

DR. BELL.

Application of the pathology of congestive fever to that of cholera in its various forms—Phlegmasiæ of the skin.—Different genera of—Hyperæmia—Exanthematæ—Erysipelas,—its treatment.—Roseola,—its varieties and treatment.—Exanthematous or eruptive fevers proper—Measles, scarlatina, and small-pox—Their precursory fever and first eruption.—Alleged differential diagnosis.—Sequelæ of eruptive fevers—Sameness of the organs affected in all of them—first, and chiefly, the air-passages; then the digestive mucous and the serous membranes and the brain—Skin and pulmonary mucous membrane, the tissues which chiefly suffer—Treatment of the eruptive fevers—Must vary with the changing character of the epidemic visitation—Explanation of different modes of practice—that in the inflammatory scarlatina—Measures required in the congested and typhoid variety—Treatment of small-pox—Prophylaxis—Vaccination; its reputed and real efficacy—Age and selection of matter.

IMPORTANT, avowedly, as is the subject of congestive fever, I should not have occupied your attention so long on it if I had not been fully

aware of the large circle of acute diseases, both the pathology and treatment of which are illustrated by a knowledge of its phenomena and progress. The same guiding principles which I laid down in the preceding lectures will make you at once cognisant of the chief indications of cure in cholera in its various forms and stages. The depression of the nervous system and constriction of the capillaries, followed by a reaction in both, and these phenomena associated, from the beginning or in progress, with inflammation of some organ, are features common to all these diseases. In all, we should endeavour, at the outset, to soothe the nervous system, to relieve the irritation and congestion of the abdominal viscera by cooling and sedative remedies applied to the digestive mucous membrane, and by mild stimulants and counter-irritants to the skin: in all, we should watch the reaction, and endeavour to ascertain how far it is simple neurosthenia, mere excitement of the nervous and vascular, and especially the capillary system, and how far there is inflammation; and then according to our diagnosis will be our directions for the abstraction of blood in the paroxysm, and the administration of laxatives and enemata in the remission. In all, we shall find this last period justify and often imperatively require quinia.

But in a more especial manner is our knowledge of the eruptive fevers increased by an understanding of the theory of febrile congestion. Opportunity is not allowed for me to enlarge on this branch of my subject in the manner I could desire; and I must be content, therefore, with stating the prominent points for your instruction. The order phlegmasiæ of the class Diseases of the Skin have been divided into five genera: — the first of these is the *Exanthematæ* proper, including, under this head, *erysipelas*, *roseola*, *rubeola* or *morbilli*, *scarlatina*, and *urticaria*. The second genus is the *Vesiculæ*, in which we find *miliaria*, *sudamina*, *varicella*, *eczema*, *herpes*, and *psora*. The third genus is *Bullæ*, the species of which are *pemphigus* and *rupia*. Genus fourth, *Pustulæ*, has in it *ecthyma*, *impetigo*, *acne*, *mentagra*, *tinea*, and *variola* and variolous eruptions. Genus fifth, the *Papulæ*, includes *lichen* and *prurigo*. *Purpura* comes under the head of hemorrhages of the skin, which constitutes the third order of the class. The first order, that preceding the exanthematous diseases, according to Andral, whose arrangement I now give, includes the *Hyperæmiæ*, which embraces the three genera of active, passive, and mechanical. Hyperæmia is simple increased fulness of capillary tissue, with often greater activity of nutrition. *Erythema*, the chief species of the genus of active hyperæmia, is characterised by red spots on the skin, of variable extent and appearance, and is produced by several causes; some external, as solar heat, hot or cold water, irritating substances, bites of certain insects, the secretion from mucous surfaces; others internal, as modifications of innervation, of which deep suffusion of the cheeks is an example, and derangements of the gastric function. There are persons who invariably have erythema, which is sometimes called hives, on different parts of the cutaneous sur-

face, in consequence of any mental emotion. In children it receives the names of tooth-rash and gum. Its duration varies from some hours and days to weeks. The treatment, which is commonly simple, will be modified by the causes producing the disease and its complications.

Erysipelas. — Some writers reject *erysipelas* from the exanthemataæ, because it is not contagious, and may, as it does, recur frequently in the same person. Important in itself, its study is useful also by throwing light on the kind of connexion and the sympathetic action, direct and alternate, between the skin and the internal organs. Erysipelas is marked not only by redness, but also by a shining appearance of the skin, and pain, heat, and tension of the teguments, accompanied, but not universally, with fever. Though it may attack all parts of the skin, it most generally appears on the regions habitually uncovered, and hence erysipelas of the face is the most common. The causes of the disease are external and internal; and are the same with those which produce erythema, to which should be added the suppression of habitual discharges, and fatigue. Certain persons have a great predisposition to erysipelas, so that the slightest irritant — the common heat of the sun or of a fire — will serve as an exciting cause. On occasions, it seems to be under epidemic influence; and there are seasons when the smallest operation, or even scratch of the skin, particularly in hospitals, will give rise to the disease. Unlike erythema, which appears in different parts at the same time, erysipelas begins at one spot and gradually increases its surface — as when it spreads, for instance, from the hand up and over the arm as far as the shoulder. It must not be forgotten, however, that there is a variety of the disease called wandering, on account of its rapid change of place. I deem it needless to enumerate all the varieties of erysipelas, the chief of which are — 1, the phlegmonous, or that which includes subcutaneous tissues, and runs into a kind of suppuration if the inflammation is not checked; 2, the bullous or phlyctenoid, in which the cuticle is raised into vesicles filled with serum; this is an evidence of intense disease, and is most common when the face is the part attacked.

The *treatment* in simple erysipelas consists in the use of diluent drinks, abstinence, and quiet. But when there are complications, and in every erysipelas of any degree of intensity these may be expected, we must adopt a different and a more decided and bold course. If the fever runs high, particularly in erysipelas of the face, there is danger of the brain suffering, and we are called upon to bleed freely. Some have objected to bloodletting, because, say they, the erysipelatous eruption goes through its course without abbreviation by this remedy; but the important consideration is the suffering internal organ, and its protection from disorganizing inflammation. If, under an idea of erysipelas being a specific disease, which cannot be treated on the same principles with inflammation generally, the use of the lancet, or at any rate of leeches

on the sound skin near the affected parts, be omitted, the patient is very apt to be affected with prolonged and sometimes fatal stupor, which is attributed to metastasis from the skin to the cerebral meninges. Where doubts exist of the propriety of venesection and of topical depletion, the administration of tartar emetic in lemonade, at any rate as a proper preliminary measure, will be found to be undoubtedly efficacious. I have had opportunities of confirming the favourable opinions of the utility of this medicine in erysipelas, so decidedly expressed by such respectable authorities as Boyer, Andral, and others. It may be given in a dose varying from the sixth to the fourth and even half of a grain, and repeated at intervals of three hours. The circumstance of the first and even second dose acting freely as an emetic will often be beneficial, nor will it interdict or render unnecessary a repetition of the medicine, which, should the excitement remain, will be subsequently tolerated by the stomach without inconvenience. But if it continue to cause vomiting, the dose must be reduced to the point of toleration. Blisters on the sound skin, yet close to the border of the erysipelatous part, were for a long time highly extolled as a means of arresting the further progress of the inflammation. Lunar caustic applied at a short distance round the inflamed part has a similar effect. I have used blisters at times and with apparent advantage; at others, I have been disappointed in the benefit anticipated from them; and I am disposed to believe that the effect of their application depends very much on the degree of inflammation or disturbance of the internal organ associated with that of the skin. The same remark applies to unguents, of which the mercurial was the first recommended, and subsequently the simple ones, directly on the diseased surface, under the allegation that mere grease was the active agent. Cloths dipped in fluid chloride of soda, or in a solution of chloride of lime, one drachm to the quart of water, are useful when applied to the part. Penciling the border of the diseased surface with a strong solution of iodine, is attended with excellent effects. Free and somewhat deep incisions into the skin and subjacent cellular tissue is just now a rather popular practice. After the stomach has been evacuated in the manner already stated, a mercurial purge should be administered; and then, if need be, the use of the tartar emetic and acidulous drinks resumed. Stupor in a more advanced stage is to be treated with calomel followed by spirits of turpentine and oil; or, if deglutition be impossible, active enemata of turpentine and oil should be administered.

Roseola is another non-contagious phlegmasia of the skin, which, independently of any intrinsic importance, merits attention on account of its being occasionally confounded with measles. Among its common names, are — *rash*, *rose-rash*, and *spurious rubeola*. Its bright rosy hue, and hence its name, will serve to enable us to distinguish it from erythema. It is more common among women and children than men, and more in summer and autumn than in other seasons. The varieties of this exanthema are —

1. *Roseola æstiva*, which is sometimes preceded by a slight fever, and makes its appearance, first on the arms, face, and neck; and in two days afterwards spreads over the rest of the body, producing a pricking and itching. It is exhibited with the appearance of small distinct spots: large, paler, and more irregular than those of measles, and which are separated by numerous spaces, with the skin of a natural colour. At first red, they soon take a deep rose colour. The pharynx exhibits the same tint, and the patient experiences in swallowing a dryness and roughness of the throat which sometimes imposes on those near a belief of the case being one of scarlatina. On the second day the eruption is still at its height, after which it becomes duller; but dark red spots remain on the fifth day, until which time the constitutional symptoms also persist. Occasionally the eruption comes and goes frequently after moral emotions, or seasoned food and stimulating drinks; but sometimes without any evident cause. The retrocession of the exanthema is accompanied, usually, with gastric disorder, headache, and a state of languor and lassitude, which promptly disappear on the coming out of the eruption. This variety, as its name implies, appears most frequently in the summer in women of an irritable constitution, and is sometimes connected with the intestinal disorders of the season. It is intermediate between erythema and urticaria. The treatment consists in a restricted diet, acidulated drink, and at times laxatives. Passing over the other varieties of *R. annulata*, *autumnnalis*, *variolosa*, *vaccina*, *miliaris*, and *febrilis*, I shall say a few words on the *roseola infantilis*, *rheumatica*, and *cholerica*.

In infantile roseola, which may be taken as the representative of the roseolous group, the spots are more numerous and crowded than in the summer roseola; and when the eruption is general, if our diagnosis were to rest on its appearance alone, the case would be considered one of measles. It attacks children during dentition, or supervenes on intestinal and febrile disorders. Sometimes it only exists for a single night, or it appears and disappears for several days successively, accompanied by a derangement of the principal functions. The rheumatic roseola is occasionally a precursor of, and at times follows, paroxysms of gout and rheumatism. That described by Dr. Schoenlein, consists of small, isolated, and rounded spots, of the size of a millet-seed or a lentil, but rarely prominent, and it is of a deep red or violet and sometimes dark colour. The fever ceases and the rheumatic pains are abated so soon as this eruption shows itself; as on the other hand its sudden retrocession by cold and moisture, or by repelling applications, will cause a renewal and aggravation of the pains. Other writers have described an eruptive epidemic rheumatism with fever. The treatment followed at Wurtzburg consisted in the use of tartar emetic, if there was gastric complication; colchicum wine if the rheumatic pains were violent, and diaphoretics, such as the acetate of ammonia and Dover's powder. The drinks are warm and demulcent: the regimen is simple and antiphlogistic. The *choleric roseola* was observed by M. Rayer on the occasion of the epidemic cholera in

Paris, in 1832. It was more frequently seen on women than men, and appeared most generally on the hands and arms, and extended to the neck, chest, abdomen, and lower limbs. Sometimes the eruption, when at its height, formed spots in tolerable approximation to each other, making a red tissue, like a slight scarlatina. In other places it resembled measles and urticaria. M. Rayer saw this eruption complicated with inflammation of the pharynx and amygdalæ, and its disappearance followed by an aggravation of the symptoms, and even death. Towards the sixth or seventh day the cuticle cracks, and falls off in large scales at the parts implicated in the eruption.

Exanthematæ. — Of the exanthematæ proper, in the preceding division, the two most important species, *rubeola* and *scarlatina*, yet remain to be noticed. But I shall not restrict myself so rigidly to the arrangement already adopted as to preclude me from speaking at the same time of *variola* or small-pox, which is often classed, together with measles and scarlet fever, under the head of *eruptive* or *exanthematous fevers.* Believing, as I do, that these diseases have much in common; and that a careful observation and study of the period of their invasion, and of the organ affected during the stage of eruption, and of their sequelæ or organic lesions and disorders consequent on the first affection, will enable us to undertake their treatment on correct principles, you will find me laying more stress on these points than on this or that popular and plausible plan of cure, or last pretended specific. I feel the more encouraged to undertake this task just now, (however imperfect and meagre it almost of necessity must be in its execution,) after my having enlarged so fully on congestive fever, the pathology and treatment of which is so analogous to those of the eruptive fevers; especially if these put on the form most calculated to alarm and embarrass the practitioner.

In nearly all the systematic works on internal pathology and the practice of medicine you will read the diagnosis of each of the three great eruptive fevers. When these are fully established, the task is easy to distinguish small-pox from measles and scarlet fever; and tolerably so the one from the other of the two latter. But I defy the most learned physician in diagnostics, if he is not swayed in his judgment by existing epidemic influences, the prevalence of a particular exanthema, and his knowledge of the febrile diseases of an eruptive kind that his patient has had before, to predict positively, from the symptoms before him, during the period of invasion and anterior to the coming out of any eruption, what disease is in process of development — whether it is a remittent fever or small-pox, — whether influenza or measles, — infantile gastric remittent and verminose fever or scarlatina. Equally difficult is it for him to say, from the precursory symptoms, which of the three eruptive fevers is about to reveal itself. You may be called to a young person who has had a chill, and whom you find suffering from headache; pain in the back and limbs; intolerance

of light and sound; increased sensibility of touch, and to the impressions of heat or cold; rigors with flushing, and gastric distress. You note, also, a tongue foul and loaded, and red at the borders; heat of the abdomen; urine high coloured; skin dry and harsh, and of unequal temperature, though commonly more elevated than natural at the trunk and head, and below the standard at the extremities; pulse frequent, and respiration hurried. If asked, what is the disease? you would naturally reply a fever. But if the kind were demanded, you would feel yourself at a loss to name it. Let us suppose that, in addition to these symptoms, you discovered the pulse to be very frequent, or upwards of a hundred beats in a minute; and that there are drowsiness and slight delirium, and a very offensive breath, with clammy mouth, and pungent heat of the skin; — you might suspect that you had a case of incipient nervous fever. If, at the same time, you find redness of the fauces and tonsils, and painful deglutition, you will incline to the belief that the disease may be scarlet fever, — but it may, also, be small-pox or varioloid. I have seen nearly all these symptoms, except the delirium, precede an eruption of *roseola*.

But you will be told that convulsions accompany the precursory fever of small-pox; so they do, occasionally, that of the other eruptive fevers, — so they do, also, verminose fever and meningitis. Stress is laid by some on a severe pain or weakness of the back, so that the patient is all at once unable to support himself on his feet; but certain epidemical influenzas have been marked by precisely the same symptom. If your patient has been vaccinated, you will be inclined to narrow the diagnostics by excluding small-pox, and then determine which of the two remaining fevers, scarlatina or measles, is coming on. Should there be, however, measles and small-pox epidemic at the same time, your patient may be in the first stage of an attack of varioloid. Contrary to opinion formed *à priori*, I have seen, and on this point I speak, for reasons soon to be given, from large experience, varioloid ushered in by a more violent initiatory fever, including delirium, than it ever fell to my lot to see in a case of small-pox. I speak now of a fact, and, without by any means affirming that it coincides with the experience of others, or that it is a general one: I believe, indeed, that it is not. Even for the first hours after the eruption has appeared, supposing your case to be one of an eruptive fever, you will still feel somewhat at a loss in discovering the variety to which it belongs. The skin of the face is deeply suffused, or erythematic, and with patches here and there of a darker shade, indicating eruption: over the axillary and inguinal regions, on the sides of the chest and abdomen, there may be also patches of a red or crimson colour, encircled with minute spots, and sometimes crops of maculæ of a less decided hue. Now it will be no easy matter to tell what precise form and kind of eruption is to rise from this groundwork. All of this latter is not the basis of eruption. Sometimes the maculæ which came out in a case of varioloid fever disappeared in a

great measure: in small-pox they commonly represented papulæ of a red and scarlet colour, which took their place, and constituted the first stage of variolous eruption. But the small, red, and somewhat elevated spots, at the cutaneous follicles, in the early period of measles, are not easily distinguished from these papulæ. Frequently in the Small-pox Hospital we had patients sent to us from the Almshouse Infirmary with a primary eruption which was supposed to be that of small-pox, but which, in fact, was rubeolous. The lapse of some hours between their entrance and our visit diminished, of course, the difficulty of the diagnosis, and gave us an opportunity, of which, however, I believe we did not take advantage, to express our surprise that the true disease had not been known to the medical inspectors of the other establishment.

In pointing out the difficulty of diagnosis in the initiatory fever of the eruptive diseases, I do not, you may be sure, mean either to mystify you, or to discourage you from a careful and vigilant study of diagnosis in general, nor even in the circumstances before us. My aim is to show you the general community of organs whose functions are disturbed in all these fevers, as I hope soon to be able to show that this character of resemblance is maintained in the course of the disease, and is proved by the *post-mortem* appearances. But whilst, with the modesty of true science you will frankly acknowledge to an anxious mother, or even to an impatient crone, that no one can say, from the symptoms during the first two or three days of fever antecedently to an eruption, what will be the precise variety of this latter, you must also have made yourself acquainted with the symptoms which are at all entitled to help you towards a differential diagnosis. These I shall now state with all possible brevity.

Diagnosis. — *Measles* is commonly indicated by symptoms of coryza and catarrh, in addition to those of a common febrile character: sometimes the former are the only precursors, and we are left to suppose the coming on of a rubeolous fever by its epidemic prevalence, the age of the patient, and his not having had the disease. Under these circumstances, if the eyes be suffused and watery, the *tarsi* red, the eyes and nostrils discharging copiously a watery fluid; and there are frequent sneezing, and a hard, dry cough, we may suspect that the patient is in the stage of precursory fever or measles. Hoarseness and weeping eyes I have, however, frequently seen to be premonitory symptoms of small-pox. Nor is the circumstance of difficult deglutition and soreness of throat diagnostic of the latter, since these symptoms are sometimes met with in measles, but less frequently than in small-pox.

The period of *incubation*, as it is termed, or that which elapses between the reception of the contagion and the beginning of the disease, is said to differ with the kind of fever. In measles, this period is represented to be from twelve to fifteen days, although some make it ten, and after inoculation Home says six, and Willan sixteen days. The period of incubation of small-pox also varies from ten to twenty, and is fixed by some at eleven or twelve

days; whilst in scarlatina it is but four days. The eruption in small-pox takes place at from one to three days after the chill of the precursory fever, — generally it is on the third day, or after-forty-eight hours; in scarlatina the eruption shows itself on the second; and in measles, on the fourth day. Often, the period of incubation is one of ailment; the exposed person complaining of lassitude, want of appetite, disturbed sleep, &c.: but in other cases, again, there is hardly any deviation from the standard of health noticed before the beginning of the paroxysm of the initiatory fever.

Of Small-pox.—As regard the appearances of the eruption in the early stage, fitted to furnish materials for differential diagnosis, we can say that the papulæ of small-pox are firmer than those of measles; and have a granular, hard feeling under the finger. But we are not left long in doubt as to the character of the eruption, if the case be one of *small-pox;* as then the *papulæ* become more and more defined and elevated, and are, after a day or two, converted into *vesicles*, with small elevated centres or bodies of a yellowish-white, and more diffused red and somewhat hard basis or margins. The first erythematic blush which preceded the eruption had yielded with the distinct formation of the papulæ: but now, as the vesicular eruption becomes copious, the redness of the margin extending especially in the face, neck, and hands, the skin becomes a red ground, from which project in relief the whitish vesicles. These latter become gradually larger, fuller, and more yellow, and filled with a thick, tenacious matter. This last change is into *pustules* or the stage of maturation, which on the face begins at the fifth day, and on the rest of the body on the eighth or ninth day: the early depression in the centre of the pustule is thought to be one of its diagnostic characters. The changes from papula to pustule are not gone through in the same period in all parts of the body. I frequently saw, in the same patient and at the same time, the eruption to be papular on the legs, vesicular on the trunk and arms, and pustular on the face. Even one part, the arm, exhibited the three stages at the same time. About the eighth or ninth day, desiccation begins with a yellow dry point on the summit of the pustule, although the suppurative stage may be said to last to the twelfth day without any material change. At the date of beginning desiccation, the body exhales that peculiar and unpleasant odour so readily recognisable after it has been once perceived. But the eruption in small-pox is not confined to the face; it extends to the mouth, pharynx, and larynx; and I have seen it as low down as the larger bronchia. Ptyalism is a common symptom in the pustular stage. The febrile symptoms which abate during the process of maturation are apt to return during desiccation, and when the skin begins to desquamate; and they then constitute what is called secondary fever. The skin which had suffered so much, occasionally exhibits at this time an erysipelatous blush, accompanied by an inflammation of the subjacent cellular tissue; and the formation of troublesome boils, or infiltration of serum, especially where there is much laxity of structure, as in the eyelids, lips,

cheeks, &c. During the years 1823 and 1824, I had ample opportunities of seeing and treating small-pox, as it occurred in persons of different ages, sexes, and colours, from infancy to adult life. The facilities given to me by my situation as Dispensary physician were still farther increased by my being associated with Dr. J. K. Mitchell, now of the Jefferson Medical College, in attendance on the Small-pox Hospital at Bush-hill, and subsequently at the old Sugar-house in the city. The results of our observations and experience in variola and varioloid and in the protecting power of vaccination obtained during this period, are to be found in two papers, the preparation of which devolved on me, published under our joint names in the *North Amer. Med. and Surg. Journ.*, vol. ii. My references already made to hospital practice, and other observations which I may still have occasion to make on the pathology of small-pox, induce me to advert to the sources of my experience on this subject. Still more in hospital than in private, and even Dispensary practice, had I an opportunity of witnessing the dangerous, and often fatal varieties of small-pox which I have described in the papers just mentioned. These were the *confluent*, that which is commonly contrasted with the regular and mild, or *discreet* eruption; the *roseate;* the *tuberculous*, and the *erysipelatous*. Drunkards among the men, and prostitutes among the women, who were attacked with variola, rarely escaped death. The former had the roseate eruption; the latter the confluent, on which dark spots, as if gangrenous, were a frequent appearance. Menorrhagia at any time in the course of the disease was a bad augury.

The differential diagnosis between scarlet fever and measles has been drawn out in detail by M. Rayer. Before borrowing from this description, I may mention that for a long time the two diseases were confounded together; scarlet fever being regarded as an aggravated form of measles until the time of Withering, and even of Willan. The eruption is of a deep scarlet colour, and hence the name given to the fever; it appears on the second day of the fever, and is distributed at once nearly over the whole body in large confluent patches of undeterminate figure. That of measles comes out on the fourth day of the fever, in spots or rash, in a series of crescents or imperfect circles, intersecting one another on the upper part of the trunk, and gradually extending to other parts: it is of a raspberry hue, and perceptible to the touch. The constitutional symptoms in measles are for the most part those of coryza and catarrh, with weeping eyes: in scarlatina the eyes are shining and inflamed; the patient complains of sore throat. In scarlatina the eruption is not followed by an abatement of the fever, such as under similar circumstances occurs in measles. Desquamation in the first is by extensive laminæ; in the second by branny scales. The secondary effects of measles are chiefly diseases of the pulmonary organs, — bronchitis, pneumonia, and sometimes phthisis. Scarlet fever leaves behind it often anasarca, inflammation of the serous membranes, and pustular formations in the joints; an, as noticed

by Dr. Graves, enlargement of the liver. Of the lesions of the organs of sense in the two diseases, ophthalmia is most common after measles, and otitis after scarlatina. According to Heim, the sense of smell will furnish us with still farther differences; scarlatina giving rise to an odour similar to that which we are sensible of in shops in which old cheese and herring are kept, or to that exhaled at some distance from the lodge of lions or other beasts of prey. This odour is perceptible from the beginning of the disease and even before the appearance of the exanthema. Measles has also its peculiar odour, which is mild for the first week, and afterwards becomes somewhat more pungent; it resembles that of goose-feathers plucked freshly from a living animal, or one which has been recently killed. After all, however, I must again remark on the difficulty of diagnosis deduced from the sequelæ of measles and scarlatina, or of these again contrasted with small-pox, which last is also followed by ophthalmia, affections of the air-passages and lungs, as well as irritability, if not positive disease, of the glandular system. Scarlatina may resemble measles in its being followed by laryngitis and bronchitis, as both eruptions sometimes are by enteritis, and particularly of the larger intestines, manifested by dysentery and diarrhœa.

Anatomical Lesions in Scarlet Fever.— One is less surprised at the general resemblance of functional disturbance after having learned that the same organs are shown, by *post-mortem* examinations, to have been the seat of structural lesions, in eruptive fevers, and this to a greater extent than might have been inferred during life. "In fatal cases of scarlet fever," Armstrong says, "you almost invariably find proofs of inflammation of the fauces extending down the larynx, trachea, and bronchia. In nine cases out of ten the air-passages are inflamed." Strong as this language seems, its accuracy is borne out by the observations on the epidemic in Edinburgh, in 1832, by Mr. Hamilton, a record of which is in the *Edinburgh Medical and Surgical Journal*, vol. xxxix. He states that almost every severe case had more or less of the chest affection; and he only met with one exception to the uniform extension in fatal cases of the inflammation to the larynx, trachea, and lungs. The comparative frequency of inflammation of the mucous membrane of the bowels, dwelt on by Dr. Armstrong, is not admitted to the same extent by other observers, though the occasional presence of this lesion is undoubted. The same remark applies to the brain, which exhibits increased vascularity, with opacity of the arachnoid membrane and effusions of serous or turbid fluid between it and the pia mater. The kidneys might be supposed to exhibit organic alterations in those cases in which dropsy had existed before death and albuminous urine was discharged; but Mr. Hamilton, who paid particular attention to the state of these organs, found in one case only the granular appearance indicative of what has been called Bright's disease.

In Measles. — The intensity of the symptoms in the acute stage of measles leaves no doubt of the fact of inflammation of the air-passages, and often of the lungs; but we cannot speak so determinately on this

point, as the deaths in this disease are more from its secondary affections. In the cases which terminate fatally, the marks of pulmonic alteration are generally clear, and next are those of inflammation of the bowels and brain. Mackintosh declares, that the lining membrane of the bronchia, trachea, and larynx, has not only been found in a highly vascular state, but it has been thickened, softened, and occasionally ulcerated; the ulcers are small, and generally situated near the bifurcation; the bronchial tubes are more or less filled with a matter like pus or thick mucus, as in bronchitis.

In Small-pox. — Almost identical with the appearances just described in subjects dead of measles, were those noticed in all the autopsic examinations which we made of persons who had died from small-pox, viz., great injection of the lining membrane of the larynx and trachea, varying in intensity from a deep red to a mahogany hue; thickening of the tissue, and most generally ulcerations extending from the fauces to the larynx, and thence down into the bronchial bifurcations, with abundant frothy mucus. The colour of the ulcerated spots was in some cases white, in others yellow. In one case, the subject of which died on the twenty-fifth day of disease, and after desquamation had been nearly completed, the lining membrane of the larynx and trachea was of a greenish-yellow colour throughout, and in the spaces between the cartilages ulcerated and disorganized in several spots; chocolate-coloured liquor, with a sediment, filled the bronchia and the larger tracheal subdivisions. In the stomach I noticed injections of more or less extent, either of a roseate hue or brown, and sometimes bloody effusion surrounded by a vascular network; the intestines exhibited similar appearances, but in a less degree and with less frequency. Enlargement of the mucous follicles in many cases might seem to the observer to be an eruption of the same nature as that on the skin. The lungs were sometimes healthy and at times inflamed, as was also the pleura, which in the latter state exhibited sometimes effusion in its cavity. The pulmonary alterations, apart from those of the air-passages, do not seem to be necessary effects of the variolous disease, but to be dependent on the season and prior exposure of the patient, either during the period of incubation, or during the secondary fever and after desquamation. On this point I used, in the communication already referred to, the following language: "It not unfrequently happened that persons who had passed through the different stages of the disease, and were advancing rapidly to convalescence, were suddenly seized with an affection of the chest, — pleurisy, bronchitis, or pneumonia, — and speedily carried off by the violence of the inflammation."

Treatment of the Exanthemata.—A knowledge of the continuity of surface exposed to the air, and the close resemblance of the skin in structure and organic functions to the respiratory mucous membrane, would prepare us for seeing, without surprise, lesions of structure of the air-passages in all the eruptive fevers. Are we able to deduce the treatment from the autopsic examinations, and the proofs of disorganizing inflammation which they reveal? Some physicians and

writers, and they of authority too, have answered this question in an affirmative sense; but, as I fear, with more boldness than accuracy. "Scarlet fever," says Armstrong, "is a disease which has been most successfully treated in modern times. Formerly it was very fatal, and I am confident that the mortality arose from bad treatment." The contrast is meant here to be made in favour of depletion over stimulation. So, also, Mackintosh, who states that he saw many fatal cases when he practised according to the opinion of the schools, "carefully abstaining from bloodletting, and using all the means recommended to support the strength;" but he "occasionally observed patients snatched from the grave by considerable bleedings from the nose, and at times when it was thought the loss of an ounce of blood would prove destructive. These circumstances," continues the author, "together with the appearances found on dissection, led me to bleed in many subsequent cases, and I have never had occasion to regret it." The practice, as advocated by these and other gentlemen, and as tried by myself at different times, was no doubt serviceable; but its success is no proof of the error of other physicians in former epidemics, who adopted a different plan of treatment; nor that those who, coming after us, do not imitate it, will be to blame. A better philosophy, based upon a large and impartial view of the facts of the case, teaches, that eruptive fevers, which in their worst form are of epidemic occurrence, vary, like other epidemics, not a little in the intensity of attack and danger at different periods. Scarlatina, measles, and small-pox too, sometimes assume an inflammatory, sometimes a congestive, and at others a more simple, yet prostrating or nervous type, in successive epidemic visitations; as in the same epidemic they will manifest these distinguishing features in particular families and individuals in preference to others. Dr. Graves, in lecturing on scarlatina, remarks, with his customary good sense, after speaking of the great mortality from scarlet fever in Dublin in the year 1801–2, and of the subsequent occurrence, at intervals, of epidemic visitations, but always in a mild form, until the wide-spreading and destructive visitation of 1834–5: "It was argued, that had the cases which proved fatal in 1801–2 been treated by copious depletion in their very commencement, the fatal debility would never have set in, for we all regarded this debility as a mere consequence of previous excessive reaction. The experience derived from the present epidemic has completely refuted this reasoning, and has proved that, in spite of our boasted improvements, we have not been more successful in 1834–5 than our predecessors in 1801–2."

I must confess — and I do so in the hope that others will be benefitted by the acknowledgment — I entertained for several years no little confidence in the value of the remedial means which I had recourse to in the treatment of scarlet fever. Both in Dispensary and in private practice I had a considerable number of patients with this disease under my care in different years; and with hardly an exception the result was favourable. My practice, and it is the one

which I am still disposed to recommend to you in the inflammatory and *anginose* variety of scarlet fever, consisted in keeping the patient lying on a mattress and lightly covered, in a room well ventilated and without a fire: after the eruption was at its height, flannel, even if worn next to the skin, was dispensed with until desquamation was in progress. Sometimes a mild emetic, and always a purgative, was administered; and if the efflorescence and cutaneous heat were great and general, cold affusion was used: a temperature less high and diffused was met by tepid affusion. For the rules and practical details on the remedial effects of bathing in fevers and the exanthemataæ, I refer you to my work on *Baths and Mineral Waters*. After the bowels were acted on, the neutral mixture, or acetate of potassa, with a portion of tartar emetic added in solution, was administered at suitable intervals. If the pulse was tense, and the evidences of determination to the head and throat considerable, or much wakefulness and occasional delirium present, I had a small quantity of blood taken from the arm, or leeches applied under the angle of the jaw, and on the skin corresponding with the region of the tonsils. Gargles, usually of a simple kind, were allowed towards the decline of the fever. The drinks were cold, and, if the patient wished it, acidulated; the regimen was of the simplest kind. After the eruption began to decline, if there were restlessness, wakefulness, and dry skin, with a frequent and yet small pulse, Dover's powder in moderate doses was given. In this way, and without being blistered or stimulated, my patients went through the disease with less suffering and to a more successful termination than I could have expected from the alexipharmic plan. I had several bad cases to encounter, too; in one of two children, who were both grievously afflicted with the disease, there was a large abscess which burst and involved with it a loss of the teguments over the parotid gland, which, until the swelling had subsided and the matter was discharged, was, I thought, itself disorganized and lost. Both recovered. I have had three cases in one family sick at the same time, in two of which scarlet fever followed measles, and in one preceded the rubeolous fever: they all recovered. I thought, and I may be pardoned, perhaps, for my presumption, that I had the power of combating scarlatina, wherever and whenever I met it, if I saw it in time, and the little patient was not broken down by former disease. But I had yet to discover the other and darker parts of the picture, and to see my patients die notwithstanding all the resources of art; and worse again, after death I sometimes could not find a trace of organic lesion, notwithstanding the violence of the symptoms during life.

As regards the probable cause of death in eruptive fevers, one is common and cannot be prevented:—I mean the loss of vitality, at any rate, of functional action, of the skin. Its secretion and absorption, fluid and gaseous, are both arrested: and as the pulmonary mucous membrane suffers in a similar manner, need we marvel that the disease exhibits the appearance of virulent poisoning, in the production of which retained excreta in the blood and deterioration of this fluid

must come in for a large share. The circulation is oppressed, the skin and mucous membranes are congested, and the nervous system is depressed and its properties perverted. To talk of inflammation in such a case gives no definite idea of the state of things, or guide for ameliorating it. Sometimes the disease is aggravated to agony: the skin becoming pale, at least losing the colour derived from the eruption, which last is then said to strike in. An effect of the concentrated irritation of the internal organs is here mistaken for a cause, — as if fainting were to be attributed to the cessation, or striking in, to use the popular phraseology, of a preceding, and, it may have been, intense blush. Though we may be afraid to bleed in such cases of great and alarming oppression, accompanied as it often is with coma, and constituting the worst or typhoid or *malignant* scarlatina, we are not, therefore, bound to stimulate. A simple abatement of internal visceral phlogosis by a cool drink, as of simple water, or a cold or tepid enema, has brought out the eruption, when hot-toddy, or wine and carbonate of ammonia, capsicum, &c., would not only fail to produce this effect, but would probably increase the violence of the symptoms. It is on this occasion that you will apply the principles which have guided us in the treatment of congestive fever; and they will be found adapted to congestive measles and small-pox, as well as to malignant scarlatina. Thus, after a mild emetic of ipecacuanha, while you give cool and simple drinks with a few drops of laudanum inwardly, you apply warmth by means of water or vapour aided by friction externally; you act through the stomach on the general system by a mild emetic; and if this organ continue, or should become very irritable, without epigastric tenderness and thirst, you may suspect congestion, perhaps inflammation of the brain or its meninges, and address your remedies more especially to that organ. To do so, you direct leeches behind the mastoid process, a few in number and repeated frequently, according to the urgency of the symptoms, so as to produce a more complete and gradual revulsion, — sinapisms at the same time being applied to the feet, or the lower limbs immersed in a hot mustard-bath. If the fauces are red, and a sense of suffocation is present, you will leech with more freedom than when they are of a whitish or ash colour. The anginose variety of scarlatina will be more especially benefitted by this leeching, which, in such cases, should always precede gargles or cauterization. When these are necessary, you will select from the list the chloride of soda or of lime, muriatic acid diluted, lunar caustic, or alum. If you have cases in which there is a persistent inflammatory and open action, calomel may be used: in those of lower or typhoid action, spirits of turpentine. So soon as the first pressing symptoms in the malignant or typhoid scarlatina, which is sometimes congesto-inflammatory, sometimes congesto-nervous, are abated or removed by local bloodletting, evacuations from the stomach and bowels, and revulsives to the skin, you ought to give the sulphate of quinia, either alone or in union with opium or the sulphate of morphia, according to the presence or absence of diarrhœa and the extent of nervous

irritation. Of the internal medicines the list must be small: a weak solution of salines may be used with advantage, as already recommended in congestive fever. Fresh and cool air is to be continually introduced into the sick room.

If in the progress of any of the eruptive fevers, inflammation of an organ arise, you must not allow any hypothetical notions respecting the modifying nature of the exanthematous poison to prevent your abating and removing it by the customary and appropriate means against phlogosis. In all these fevers, there is no little danger of sequelæ occurring or of their being aggravated after desquamation is completed, or even in its progress, by exposure of the skin to a cold and moist air, and above all to currents of air. The clothing, however light during fever, should now be of suitable texture, and abundant both day and night, in order to prevent a real congestion, and, not seldom, serous effusions from such exposures.

On the treatment of *small-pox* I have little to offer, after many months of large daily clinical experience in Hospital and Dispensary practice. The cooling regimen, or cool air and cool drinks, ought to be carried out as far as the feelings of the patient require, but no farther. The mere fever and eruption will not call for venesection, or other active depleting remedies, unless some important organ, such as the brain or lungs, be inflamed or much congested. The great source of danger is from the inflammation and ulceration, and necessary interruption of function of two such important membranes as the cutaneous and the pulmonary mucous. Laxatives, to preserve a regular state of the bowels, cool and acidulated drinks, and fresh but not very cool air, and light vegetable nutriment after maturation is complete, with the occasional administration of Dover's powder, and, if the debility be considerable during the desiccation of the eruption, wine-whey, will constitute the outlines of the treatment in small-pox. In anginose complications of unusual severity it will be neccessary to cauterise the fauces, palate, and tonsils, in the manner and by the means already advised in cases of angina maligna or diphtheritis.

But a question of still more importance than the treatment of variola is its *prophylaxis* by vaccination. On this point I shall content myself with extracting, for your benefit, the contents of a note of mine in my edition of Underwood's *Treatise on the Diseases of Children* (1841).

Vaccination. — The extensive and fatal variolous epidemics within the last twenty-five years, and the very frequent occurrence of variolous disease after vaccination, generally in the mitigated and somewhat modified form called varioloid, have very naturally excited the profession to new and more extended inquiries and experiments on the whole subject. Some were induced to deny the protecting power of the vaccine against the variolous contagion, and others have contended that the protection was only effective for a limited period, — on the duration of which there was, however, little accordance of opinion. Extensive opportunities of experi-

mental observation during an epidemic visitation of small-pox in Philadelphia, in the years 1823 and 1824, procured at first in Dispensary and private practice, and subsequently during a six months daily attendance in the Small-pox Hospital, convinced me that these fears and objections were either unfounded or greatly exaggerated. The chief cause of variolous seizure of vaccinated persons was and is the imperfect and incomplete vaccination to which they had been subjected, either owing to spurious vaccine matter having been used, or the person on whom the operation was performed being at the time affected with a cutaneous disease. Giving additional force to these causes, was the predisposition induced by the state of the atmosphere during the prevalence of epidemic small-pox, so that contact with a patient labouring under small-pox, or still more, breathing the air contaminated by volatilized contagion from his body, subjected an imperfectly vaccinated subject to the varioloid, or modified small-pox, which under similar circumstances of personal exposure but different atmospherical constitution he would have escaped. A farther cause was to be found in the peculiarity of constitution of the vaccinated individual, by which he was liable to an attack of small-pox, just as persons of a particular constitution have had a *second* attack of small-pox, although the first had been of such violence as to threaten life and to scar and disfigure the skin.

Overweaning confidence in the all-protecting power of vaccination against small-pox was followed by undue mistrust of its efficacy. Physicians had too generally forgotten, that Jenner himself, and some of his zealous contemporaries engaged in the same philanthropic task with him, had clearly pointed out the fact of small-pox supervening after vaccination had been duly performed. The reason then assigned was the shortness of time that had elapsed between the vaccination and the exposure to variolous contagion. Since, and now, the reason set forth is the length of time, by which the vaccine impression on the system is worn out. Both of these two opposite and contradictory reasons cannot be true — the probability is, that neither rests on a stable foundation.

In two papers which I wrote and inserted in successive numbers of the *North American Medical and Surgical Journal*, (vol. ii., 1826,) exhibiting the joint experience of Dr. J. K. Mitchell and myself, we concluded with the following inferences, the accuracy of which has been tested by succeeding observations in different parts of Europe, and of this country. The first inference was, that the disease which prevailed in Philadelphia, in 1823–4, and which we had been called upon to treat in so large a number of cases, was the real small-pox.

2. That this disease, distressing to the person labouring under it, and disgusting to all those in attendance, is usually violent, never without danger, and always in large proportion, under any known treatment, is of fatal termination.

3. That the unsusceptibility of persons who have once had the small-pox to a second attack, though of general notoriety and truth,

is not universal, and that with us, as elsewhere, persons, thus apparently protected, were seized with the disease, of which some of them died.

4. That inoculation of small-pox, though in general conferring on the person subjected to this process immunity from the effects of variolous contagion in after life, does not necessarily or infallibly guaranty him against the disease, nor prevent death when it has made its invasion.

5. That vaccination cannot now, any more than on its first introduction, be received as a certain preventive against the effects of the variolous poison, though now, as formerly, it must be considered as the best and safest with which we are acquainted.

6. That occasionally under all circumstances of exposure, but more especially during the epidemic prevalence of small-pox, its contagion will affect both the inoculated and the vaccinated, and produce in them a fever and eruption, differing in no essential feature from the primary variolous disease, except in the general mildness and speedier subsidence of the cutaneous disorder, and the more common exemption from secondary fever.

7. That, of the inoculated and the vaccinated exposed to the variolous poison, the former will more probably escape its influence than the latter; but if both be affected by this contagion, the chances of recovery are in favour of the vaccinated.

8. That the protecting power of the vaccine virus on persons who have been duly subject to its influence, is not diminished nor destroyed by the length of time from its first introduction into the bodies of such persons; and that no proportion whatever exists between its efficacy and the recency or remoteness of the epoch, when the constitution was placed under the influence of the virus.

9. That there is no reason for believing in the deterioration or alteration of the vaccine virus, which is used at this time, from that which was in use during the first years of the practice of vaccination.

I am well aware, that of late years re-vaccination has been practised on a large scale on the soldiers in the armies of Prussia and Wirtemberg, as well as on the people, and with such results as would seem to weaken a belief in the continuedly protecting power through life of the first vaccination — but other and different testimony leave us nearly free to retain our first belief, with the explanations already offered.

Age for Vaccination — Selection of Matter. — I have always myself delayed vaccinating an infant until it was three or four months old; the practice, deemed to rest, by many of my medical friends, on speculation, is now gaining ground. Dr. Heim, of Wirtemberg, in a valuable work, of which a full analysis and critical notice are to be found in the *British and Foreign Medical Review*, for January, 1839, thinks that no child should be vaccinated within the first twelvemonth. I do not believe that so long a period is necessary for the functions of the new being to acquire their proportionate and harmonious rhythm and sympathy with one another,

and thus to insure an adequate and permanent impression being made on the system at large through the local affection on the skin produced by the vaccine virus; at the same time that I am fully convinced of the necessity of waiting some months after birth until this co-ordinate action and sympathy are established. "Four months," says the Reviewer, "was the age at which variolous inoculation was most successfully practised, and we are convinced that the same period is equally fitted for the development of the vaccine."

As to the kind of vaccine matter to be selected, there will be little difficulty, if due attention have been paid to the preliminary conditions, for the performance of the operation on the persons from whom we procure the vaccine matter. Although it is desirable on occasions to be able to use the fresh lymph, yet, for nearly all practical purposes, the dried matter of the scab, after the vesicle has attained maturity, will suffice. The greater convenience in keeping and transporting the vaccine matter in this state, has led pretty generally to the practice of vaccinating from the scab, previously moistened with water, and reduced to the consistence of mucus or thin mucilage, before it is used.

A question recently argued with considerable zeal is, whether matter from the human subject, after its transmission from person to person for a series of years, is to be still preferred to matter recently procured from a cow. Means of ample comparison within the last three years have been furnished to the profession in England, and measurably to many physicians in the United States, chiefly through the labours of Mr. Estlin of Bristol; but as yet the question is not clearly settled. The few comparative trials made by myself do not incline me to give a preference to the vaccine virus recently procured from the cow.

Another question of practical moment is, the number of incisions or of points for the insertion of the vaccine. Commonly, one has been thought enough: but within a short period the practice of making numerous incisions has strong advocates, the chief of whom are Eichhorn and Gregory. The main advantage alleged to accrue from numerous insertions (by puncture or incision) is the greater probability of constitutional fever ensuing, and the consequent immunity from small-pox afterwards, or the necessity of re-vaccination. From three to twenty is the number of punctures or incisions and the insertions of vaccine matter in them recommended by different practitioners.

I shall conclude this note by suggesting to the reader the strong probability, resting on evidence from different quarters, of the influence of atmospheric temperature on the development of vaccine pustules. The effect of cold in retarding and of heat in accelerating their progress, must be admitted to a certain extent. But in addition to these more obvious conditions of atmosphere, there are others of a local kind which greatly affect this question, such as the sirocco in Italy, the hot winds in Egypt, &c. — See *Brit. & For. Med. Rev.*, Art. *ut supra*.

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Yellow gum; *see* Icterus infantum.

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